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Table of Contents

Editor's Comments 76

The Charter Party of the *Triall:* An Unsuccessful Virginia Venture, 1606-1607, by JOHN C. APPLEBY 77

The Maine Transatlantic Salt Trade in the Nineteenth Century, by WAYNE M. O'LEARY 83

U.S. Navy Gun Carriages from the Revolution through the Civil War, by SPENCER C. TUCKER 108

The Ship *Sooloo*(II) of Salem 1861-1887: History and Research for Building a Model, by ROB NAPIER 119

Books Received 138

Book Reviews 141

EDITOR'S COMMENTS

THIS issue of the *Neptune* deals with a number of maritime topics in quite a new way. It begins with John C. Appleby's re-examination of the case of the *Triall* in an article entitled, "The Charter Party of the *Triall:* An Unsuccessful Virginia Venture, 1606-1607." This represents a new look at certain aspects of the venture that was the subject of a piece done some sixteen years ago for our journal by David Quinn. In it Appleby shows that rather clear links existed among a number of elements: piracy against Spain; exploitation of Ireland by British adventurers; and overseas expansion in the New World—an interesting trilogy indeed.

Then we have a long and important discussion by Wayne M. O'Leary of "The Maine Transatlantic Salt Trade in the Nineteenth Century." Here, O'Leary brings to our attention a number of important aspects of this maritime activity by Down East mariners during the years of the mid-nineteenth century. He shows how salt was essential in the building of ships as well as in the preservation of fish, how Liverpool salt replaced natural solar varieties from Iberia and the West Indies, and how several new triangular trades developed as a result of this. And last of all he explains why this commerce in transatlantic salt ended soon after the Civil War.

Then we turn to a detailed discussion by Spencer C. Tucker, "U.S. Navy Gun Carriages from the Revolution through the Civil War." This article analyzes in a careful, technical way how gun carriages on American warships developed during these years and should be of special interest to all those who are concerned with naval ordnance and how it changes in various ways.

And last of all in this issue we have a long, well-illustrated article by Rob Napier entitled, "The Ship *Sooloo*(II) of Salem 1861-1887: History and Research for Building a Model." As the title explains, this goes into the way in which research on the history of a vessel in *all* its aspects including ship plans, photographs, article renderings and much else can be used to create an accurate ship model.

What brings all these articles together is what they reveal about maritime historians at their best. They show the insights that can be revealed by probing patterns of economic and technical changes using plans, photographs and statistics on a worldwide scale to explain and illuminate our maritime past. All of us concerned with the sea are in debt to such authors for articles of this calibre.

And finally we wish to congratulate our American yachtsmen who brought the America's Cup back to our shores. We salute their skill and want to thank them also for helping to reveal us to the maritime world of Down Under.

ARCHIBALD R. LEWIS

Salem, Massachusetts

The Charter Party of the *Triall:* An Unsuccessful Virginia Venture, 1606-1607

JOHN C. APPLEBY*

THE voyage of the *Triall* in 1606-1607, although abortive, is of considerable interest in the early history of English enterprise in North America. It occurred several months after the official formation of the Virginia Company in London and Plymouth and, as D. B. Quinn has indicated, illustrates a wider, and more complex, interest in Virginia venturing than had previously been thought.[1] Unfortunately many aspects of the origins and organization of the venture remain obscure. The surviving evidence is exceedingly sparse and fragmentary; it was only through patient research among the voluminous records of the high court of admiralty that Quinn was able to piece together the tangled story of an intriguing, if ultimately unsuccessful, episode in transatlantic enterprise. Given the scant documentation for this and similar voyages in the early seventeenth century, any general assessment thereof, it has been aptly explained, "cannot be done until all the surviving evidence about these episodes has been set out and evaluated line by line and, almost, word for word."[2]

The story of the *Triall,* as related by Professor Quinn, is one of cupidity and mismanagement almost from start to finish. According to the agreement made between the owners of the *Triall* and her freighters, a syndicate which included George Kennithorpe, Arthur and George Chambers, and others, the vessel was to sail to Virginia on a voyage of commercial reconnaissance. Essentially, it was an attempt by a syndicate derived from the Fishmonger's Company of London to exploit the recent discovery of new, rich fishing grounds off the coast of Maine. George Waymouth's return from Maine in 1605, followed by James Rosier's report of the voyage, presenting a picture of "waters teeming with fish," probably accounts for the interest of the London fish merchants in the north Virginia coast.[3] Of the early plans and ambitions of the venturers little else is known. By the time the *Triall* set out in June, however, "an Irish dimension had been injected into her objectives."[4] The circumstances in which this crucial development came about are obscure. The initiative may possibly have come from Sir Arthur Chichester, Lord Deputy of Ireland, for it was a "protégé" of his, Sir Ralph Bingley, who was issued with a passport for the voyage, on 28 May 1606, to command the vessel. On receipt of the passport, Bingley returned to Ireland, "to assemble an expedition which was being prepared there." The wider purposes of the expedition are unclear. Bingley's role may have been to recruit catholics in Ireland to add to the venture, which may conceivably have had some connection with parallel attempts to follow up Waymouth's voyage with a colonizing expedition to Maine, led by Sir John Zouche. The exact composition of these diverse interests in north Virginia venturing, or of their relationship with each other, however, remains frustratingly obscure.

In the meantime, on 1 June 1606, the *Triall* had finally set out. She took nearly eight weeks to reach Ireland, where two other vessels, the *Dragon* of London, owned by Sir John Ferne, and the *Greyhound* of Bridgewater, owned by Sir Henry Thynne, were awaiting her

*I am indebted to Prof. David B. Quinn for reading and commenting on an earlier draft of this article.

1. D. B. Quinn, "The Voyage of Triall 1606-1607: An Abortive Virginia Venture," *American Neptune* 31 (1971), 85-103.

2. David B. Quinn and Alison M. Quinn, eds., *The English New England Voyages 1602-1608* (The Hakluyt Society, 2nd Ser. 161, 1983), p. 12.

3. Kenneth R. Andrews, *Trade, plunder and settlement. Maritime enterprise and the genesis of the British Empire, 1480-1630* (Cambridge, 1984), pp. 308-9.

4. Quinn and Quinn, eds., pp. 73-74.

arrival. Within a few days, however, the squadron dispersed and the Virginia project seems to have been abandoned: instead of departing for North America it was rumored that Bingley "was determined to goe for the Abbay of St Nicholas in Russia to make spoile thereof" (i.e., Archangel).[5]

The rumors were undoubtedly a cover for some other intended enterprise, but what this was to be remains uncertain. Bingley later gave the impression that he was intent on sailing to Virginia on his own, but this was after the voyage had degenerated into a piratical cruise off the coast of Spain where Spanish and French ships were taken, provoking a storm of protest from the Spanish ambassador in London, as well as precipitating a crisis in Anglo-Spanish trade. As in many similar ventures, plunder proved to be an almost irresistible temptation, revealing, all too clearly, that gap between ambition and reality which characterized the English overseas movement in general.

Questions and uncertainty still remain, however, about crucial aspects relating to the character and arrangement of the venture. The discovery of a copy of the charter party for the voyage, printed in full for the first time below, while by no means providing all the answers to such questions, does add something to the present state of knowledge, confirming, as well as amending slightly, the picture presented by Quinn. The document, which is to be found among the miscellaneous and uncalendared records of the high court of admiralty, is also of considerable interest in its own right, being one of the earliest surviving charter parties for a Virginia voyage. The copy that survives among the court's records was presumably made to form part of the evidence in the subsequent legal action, which the shipowners took against the freighters for breach of contract. Although written on paper it remains in good condition apart from some fraying and fragmentation at the edges—the result of being folded up for easier storage.

The principal objective of the voyage, as the charter party confirms, was commercial. The *Triall* was to sail to the coast of Virginia, and possibly other places farther south or north, to initiate some form of commercial contact. Unfortunately no information is given as to the nature of the proposed contacts; evidence regarding the character of the cargo to be carried outwards bound is lacking. It is known, however, that the *Triall* carried a substantial amount of salt, which belonged to the shipowners, indicating that one of the purposes of the voyage was to include fishing in the recently discovered rich waters off Maine. It is also clear from the charter party that this may not have been the sole involvement of the shipowners in the venture; by the terms of the agreement the owners were allowed "to adventure in the said shipp both outwardes & homewardes the full value of fyftye poundes of lawfull money of England in goods and merchandizes free of all freight and ship charges."[6] While this may merely refer to the lading of salt carried outwards bound, it might also suggest that the owners had a wider interest in the voyage and hoped to participate in any trade which occurred during its course.

By far the most interesting revelation of the charter party, however, is the list of freighters of the vessel. To date these have been identified, from other evidence among the records of the high court of admiralty, as George Kennithorpe, and George and Arthur Chambers, of whom the latter was appointed as master of the *Triall*. In the charter party printed below the freighters are named as Kennithorpe, Edward Weare, mariner, and Sir Ralph Bingley. It is the inclusion of Bingley among these names that is most interesting, for until now his role in the origins and early development of the venture had been uncertain. As the charter party indicates, however, Bingley was involved in the *Triall* venture right from the start, and may have been the leading figure in its genesis. As such this would make the connections between the *Triall* venturers and Ireland much firmer and closer than previously suspected, with Bingley acting as the crucial intermediary between backers in London and Ireland. Bingley had been in Ireland since 1598 as a professional soldier during the closing years of the Nine Years' War; at the same time he also built up large landed interests in northwest Ulster. In 1602 he received, among other grants, the entire fishing rights of Lough Swilly, which may have brought him into contact with London fishing interests and so into the circle of adventurers who were to make up the *Triall* venture. Although there is little direct evidence to support such a conjecture, at least one of the owners of the *Triall*, William Angell, was subsequently

5. David B. Quinn, ed., *New American World: A Documentary History of North America to 1612*, 5 vols. (London, 1979), III, 396-402, where much of the relevant material relating to the voyage is printed.

6. Unless otherwise indicated all references are to the charter party printed below.

to acquire significant business interests in Ireland, which may have included involvement in the coastal fishery and fish trade. Thus, the Irish or Anglo-Irish dimension was an essential characteristic of the venture from its inception, and not a later addition. From this perspective the voyage of the *Triall* might be seen as one of the precursors of a variety of Anglo-Irish schemes that were put forward during the subsequent war between England and Spain from 1625 to 1630—and in which Bingley was again involved.[7] In part at least, therefore, the *Triall* venture illustrates the close, if ambiguous and complex, relationship between English enterprise in Ireland and in transatlantic venturing.

Bingley's participation in the voyage of the *Triall,* however, still remains problematic, and has never been fully explained. It has been suggested that he turned to transatlantic enterprise partly as a result of financial difficulties. Certainly, like many ex-soldiers and settlers in Ireland trying to adapt to the new, relatively peaceful climate of the early seventeenth century, he was eager to exploit all the possibilities for future gain. This eager, entrepreneurial approach to the settlement of Ireland in the decades after 1603 may have tempted him into the *Triall* venture. Plans could have been formulated during the latter part of 1605 when Bingley was in London, with William Angell being the likely contact.[8] Unfortunately, until further evidence is found which can shed light on the origins of the venture, this must remain only a possibility. Nor, alas, does it help to solve the outstanding question mark hanging over the venture in general: did Bingley intend its piratical course right from the start or not? It is at least clear by the latter part of 1606 that the Virginia venture had been abandoned, despite Bingley's later protestations to the contrary. By mid-December the *Triall* was at Kinsale where Bingley was apparently consorting openly with pirates, who infested the southwest corner of Ireland during the early seventeenth century, using ports such as Baltimore, farther along the coast, as bases in which to refit and revictual or to dispose of captured plunder. Although Bingley subsequently proclaimed that "my thoughtes did soare to highe to stoope at those base & forbidden baytes that Pyrates oft are wont to byte at," he admitted, "as my fortunes did change, I lackt no offers that weare daylie presented mee by men of that qualletie whoe with their shippes & themselves proffered mee their service."[9] Such offers were probably made while Bingley was at Kinsale. Indeed, by the time he eventually put to sea, he had a crew of almost 160 men aboard the *Triall,* compared with the 30 mentioned in the charter party below, and with which he presumably left London. This massive increase in the ship's complement, most of which almost certainly came from the floating population of the pirate community in Ireland, casts considerable doubt over Bingley's later protestations of innocence. Moreover, the inflated size of the crew—in a vessel of only 160 tons—indicates that the earlier-intended fishing venture had been given up, and strongly suggests that plunder was now the prime purpose of the voyage.

The remainder of the document confirms, and fills out, much of what is already known of the voyage. The charter was to last for six months, starting on 10 March 1606, at a rate of £30 per month, although it is clear that a three-month extension was envisaged at the same rate of freight. The freighters were to pay the agreed amount, of £180, at the end of six months, irrespective of whether the ship had returned earlier or was still at sea. If the vessel was still at sea the remainder of the freight charges were to be paid on its return. The flexibility which characterizes such time-charters was typical of the early, pioneering days of English overseas enterprise, "when trading conditions were still uncertain and firm experience of voyage times not yet available."[10] Once these had assumed a more regular form, sometime after 1660, the use of the time-charter tended to disappear. As in many other early charter parties, moreover, Bingley and his partners were to be responsible for placing the crew, and of their payment, with the exception of certain key officers. Thus the master, purser, boatswain, and carpenter (out of a total complement of thirty men) were all to be nominated and placed in the *Triall* by her owners. This was done to safeguard the interests of the latter. It may also reflect some doubt, on the part of the owners, as to the outcome of the voyage, in what was a rather risky enterprise at a delicate time in Anglo-Spanish relations. If

7. See, for example, Bingley's proposed scheme for an Anglo-Irish privateering expedition ca. 1627, Public Record Office (London), State Papers (Ireland), 63/268/34. And R. J. Hunter, "Sir Ralph Bingley, ca. 1570-1627: Ulster Planter," *Plantation to Partition,* ed., Peter Roebuck (Belfast, 1981), pp. 14-28.

8. Hunter, op. cit., esp. pp. 17-20.

9. Quinn, ed., op. cit., III, 401-2.

10. Ralph Davis, *The Rise of the English Shipping Industry in the Seventeenth and Eighteenth Centuries* (London, 1962), pp. 166, 168-71.

so, the subsequent course of the voyage amply fulfilled those doubts, and provided a classic example of the dangers and risks facing shipowners in the uncertain, hostile environment of the early seventeenth century.

Despite its evident failure, the *Triall* venture is of considerable interest in illuminating the complexity of the English approach to Virginia in the opening years of the seventeenth century. An important part of this approach was also closely intertwined with English enterprise in Ireland. In this case Sir Ralph Bingley, the Ulster planter, was the key figure in the genesis and subsequent failure of the venture. Bingley's involvement in the project also reveals much about the interests and ambitions of many new English settlers in Ireland. Like many other adventurers he was anxious, above all, to acquire profit and advancement. And, also like many others, he was prepared to bend, break, or simply ignore the law. Irregular or illegal land purchases, piracy, or illicit dealings with pirates were almost the stock in trade of such adventurers. Many of them, again like Bingley, had come to Ireland as soldiers in the Nine Years' War but it was not until the early seventeenth century that they were given the opportunity to indulge in wide-ranging speculations of varying degrees of legality. It is in this perspective that Bingley's abortive Virginia venture is probably best fitted—as a speculative venture which carried within it the seeds of its own failure. Given Bingley's own background and interests it was always likely that the voyage would descend to illegal plunder and piracy. Thus the inglorious conclusion to the voyage of the *Triall* not only sheds light on many of the immature aspects of early English transatlantic enterprise, it also reveals some of the deep-seated weaknesses of English enterprise in Ireland; all too often both pointed in the same piratical direction.

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P.R.O., H.C.A. (Miscellanea) 30/843, unnumbered.

This Indenture made the seaventh daye of Marche 1605, And in the years of the Raigne of our Soveraigne Lord James by the grace of God King of England Scotland Fraunc and Ireland defender of the faithe &c (vizt.) of England Fraunc and Irland the third and of Scotland the nine and thirtiethe Between Lewis Owen and William Lancaster Esquires, William Angell and John Halsye (owners of the good shipp called the Triall of London of the burthen of one hundred and threescore Tonnes or there abouts, now rideing at an Anchor in the River of Thames within the port of the Cittye of London) of th'one partye and Sir Ralphe Bingley Knight George Kennithorpe gentleman and Edward Weare Maryner of th'other partye." Witnesseth that the said L.O. W.L. W.A. and J.H. have graunted and letten to fraight the said shippe unto the said Sir R.B. G.K. and E.W. by the monethe for and duringe the time and space of Six moneths to be accompted from the tenth day of this present moneth of Marche at the rate and for the price of Thirty pounds of lawfull monye of England for every severall monethe of the said six monethes, And for such and so longe time after the said six monethes expired, not exceeding three moneths more, as the said Sir R.B. G.K. and E.W. or their Assignes shall thinke good at the like rate and price of thirtye pounds of like lawfull money of England for every severall monethe from and after the said six moneths, and so after the like rate for a more or lesse time then a moneth after th'expiracion of the said six moneths. And that the same Sir R.B. G.K. and E.W. have so hired the said shipp for a voyage with her to be made by gods grace from this porte of London to suche place and places upon the Coast of Verginea and other places in such manner and forme as in thes presents is expressed lymytted and declared. And for performanc of th'intent and agreement of the said parties, the said L.O., W.L. W.A. and J.H. have before th'ensealing and deliverye of thes presents delivered unto the said Sir R.B. G.K. and E.W. the said shipp strong and stanche, and well and sufficiently tackled, apparelled, and furnished, with all such tackle apparell and furniture, as is mencioned and expressed in an Inventorye therof subscribed by all the said parties, which shipp and furniture they the said Sir R.B. G.K. and E.W. do by thes presents acknowledge to have Received accordinglie. And it is agreed by and between the said parties to thes presentes, that the said shipp shall at th'appointmente and in the service and imployment of the said Sir R.B. G.K. and E.W. depart out and from the said River of Thames, and shall by gods grace, as wynd and weather shall serve saile to and from such portes and places in or neere Virginia and other places in the parts of beyond the seaes being in league and amity with the Kinges Majestie. And where the said shipp may safely arive, as the said Sir R.B. G.K. and E.W. or their Assignes shall appoint and thinke fitt and convenient for tradeing and performeing of the voyage now intended by all the said parties. And that the said shipp beinge dispatched at Virginia and other parts of beyond the seas, shall as winde and weather shall serve, saile, returne, and come from thence into the said Porte of the City of London as neer to the same Citty as she may safely arive there at an Anchor to make her right discharge and end of her said pretended voyage. And the said Sir R.B., G.K. and E.W. for them and every of them, their and every of their Executors and administrators do Covenant and graunt Joyntly and severally to and with the said L.O. W.L. W.A. and J.H. their Executors and Administrators by thes presentes that they the said Sir R.B. G.K. and E.W.

11. Hereafter abbreviated.

or their Executors or Assignes shall and will, for and towards the payment of the said monethlie freight of thirty pounds a moneth at the end of six moneths next after the said tenth daye of this present moneth of Marche well and trulie paye or cause to be paid unto the said L.O., W.L. W.A. and J.H. their Executors or assignes at or within the new dwellinge house of the said William Angell scituat in ould fish street in London, the somme of One hundreth and fowrescore pounds of lawful money of England, and for all such time as the said shipp shalbe imployed by the said Sir R.B. G.K. and E.W. or their Assignes over and above the said six moneths. The said Sir R.G. and E. shall at th'end of the said pretended voyage, and before they or any of them shall discharge any of the goods or Marchandizes which shalbe brought home in the said shippe, well and trulie pay or cause to be paid unto the said L.O., W.L. and W.A. and J.H. at the place aforesaid all such some and sommes of money as then shall after the said rate of Thirty pounds a moneth proporcionably have growen and arisen to be due and unpaid unto the said L.O. W.L. W.A. and J.H. And also it is agreed that althoughe the said shipp shall returne before th'end of the said six moneths, or that they shall not proceed upon their voyage or shal before the said six moneths expired miscarry or be loste in the said pretended voyage, that yet nevertheles the said Sir R.B. G.K. and E.W. or one of them their Executors or Assignes shall trulie pay or cause to be paid unto the said L.O. W.L. W.A. and J.H. at the place aforesaid at th'expiracion of the said six moneths the said somme of one hundreth and fowerscore pounds, And also within one moneth after the miscarryinge of the said shippe (if she miscarry after th'expiracion of the said six months) all and every other such some and sommes of money which after the same rate of Thirty pounds a moneth shall growe due or payeable from th'expiracion of the said six moneths untill such her miscarryinge after the said six months, anythinge herin conteyned to the Contrary notwithstandinge. And further the said Sir R.B. G.K. and E.W. for themselves their Executors and Administrators doe Covenant promise and graunt joyntly and severally to and with the said L.O. W.L. W.A. and J.H. and every of them their executors and administrators by thes presentes in manner and forme followinge (that is to saye) that they the said Sir R.G. and E. or their Assignes shall within the said time and space of nyne moneths at farthest (the perills and dangers of the seas excepted) bring againe the said ship into the said River of Thames, and there to redeliver the same unto the said L.O. W.L. W.A. and J.H. their Executors or assignes, together with all and singuler her furnitures, tackle and apparell mencioned in the said Inventorye subscribed by all the said parties as aforesaid in as good case as the same now is. (The reasonable & ordenary use and wearing therof excepted) Except such and so much therof as shalbe needfully & necessarilie spent & worne out in the said voyage. And further that they & the said Sir R.B. G.K. and E.W. their Executors or assignes or some of them shall at their or some of their owne Charges provide and put aboord the said shipp so many able and sufficient Maryners, as together with the master, Purser, Botson and Carpenter (which by speciall agreement of the said parties are to be put aboord nominated and placed in the said ship and voyage by the said L.O., W.L., W.A. and J.H.) shall make up the full nomber of Thirtye persons in all together with victualls good fitt & sufficient for the same Maryners and persons in and during the said voyage both outwardes and homewardes and that the wages and victualls of the said persons and Maryners shalbe paid and provided by the said Sir R.G. and E. their Executors or Assignes at their own proper Charges. And further the said Sir R.B. G.K. and E.W. do Covenant promise & graunt joyntly & severally by thes presents, That the shipp shall not saile or be directed or carried into any harbour or other place, which shall or may be likely to hurt or endanger the said shipp, or to hurt loose or spoyle any of her furniture tackle or aparell unto her belonging, otherwise then by ordenarye wearing of the same. And moreover that the said Sir R.B., G.K. and E.W. shall not at their own Charges cleare and discharge the said ship and her Company of and for all Charges and dutyes whatsoever, at all and every portes places Rivers and harbors, where she shalbe or remaine or saile unto in or during the said pretended voyage. And it is agreed by and between the said parties to the presentes That the said Sir R.B. G.K. and E.W. or their assignes shall at their owne Charges provide furnishe and put aboord the said ship, sufficient gunpouder and shot to be spent for the defence of the said shipp both outwardes and homewards in and during the said voyage. And the said Sir R.B. G.K. and E.W. doe further Covenant & promise by thes presentes, That they the said Sir R.G. and E. nor any of them, nor any of the said ships Companye shall be any wayes or meanes whatsoever during such time as they shall hold and occupie the said ship, molest, truble, hurt or surprise or endamadge any of the subjectes of our soveraigne lord the Kings Majestie, or to any other person or persons whatsoever, being in league with his majestie, or any ship, vessell, goods, or other things belongeing to any of the Kings Majesties subjectes, or to any other person or persons, being in League or amitie with his majestie. And further it is agreed that it shall and may be lawfull to and for the said L.O. W.L. W.A. and J.H. their Executors or assignes to adventure in the said shipp both outwardes & homewardes the full value of fyftye poundes of lawfull money of England in goods and merchandizes free of all freight and ship charges, and the same goods and marchandizes shall and may quietly receave and have at any porte or portes where the said ship shall arive, without any the let or hindrance of the said Sir R.G. and E. or any of them their Executors or Assignes or any of the Ships Companye. In witness wherof the parties aforesaid to these presents enterchangeablie have put their hands and Seales geoven the day and yeare first above written.

Sealed and delivered by the said
Sir R.B. and G.K. in the presence of
me John Harison Scrivener.

Endorsed: The Charter party between parte Sir R.B. L.O. W.L. W.A. & J.H.

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The Maine Transatlantic Salt Trade in the Nineteenth Century

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THE movement of salt cargoes under sail is one of the most storied of all maritime trades and historically one of the oldest. As the indispensable preservative of the ancient and medieval worlds, salt figured prominently in the commerce of the early Phoenicians, the sea traders of Venice, and the merchants of the Hanseatic League. By the dawn of the modern age, the salt trade had become transoceanic in scope, contributing in no small measure to both the economic growth of colonial New England and the founding of Newfoundland.[1] Toward the middle of the nineteenth century, this Old World trade with North America reached its fullest development and then fell into gradual decline. It was during this ultimate and final chapter of an international commerce which traced its lineage back over two thousand years that the state of Maine played a brief but significant role.

While merely one component of the vast transatlantic saline trade, Maine's seaborne salt commerce was nevertheless uniquely important in several respects. To begin with, it provided New England's leading maritime state after Massachusetts with its largest foreign import commodity for the better part of a half-century. Notwithstanding the immense West Indian molasses trade, crucial to the maintenance of Portland's lucrative sugar industry, it was salt that accounted for most of Maine's foreign import tonnage. In 1857, when an antebellum record 828,000 bushels entered through Maine seaports, salt deliveries substantially outdistanced the second-place import commodity, molasses, in actual landed weight and far exceeded the state's other major bulk imports, iron, coal, and brown sugar. Maine's salt tonnage for that year approximately equalled the tonnage of its next four imports combined.[2]

In addition to being the state's dominant bulk import, salt was significant in another way. Quite simply, it provided the basic underpinning for coastal Maine's entire maritime economy. Although some foreign salt arriving at down-east ports unquestionably found its way into the nearby hinterland for domestic and agricultural usage, it is clear that most went for other purposes. Chief among these were the maritime activities of shipbuilding and deep-sea fishing.

Maine was the preeminent American shipbuilding state during the nineteenth century, and more wooden vessels were laid down in its shipyards than anywhere else in North America. Next to timber itself, the most critical component in the construction of wooden hulls was salt to preserve that timber from decay. Immense amounts were used for this purpose, as much as fifty to seventy tons going into the largest square-riggers on occasion. The usual technique among shipwrights was to fill the spaces between the frame timbers from the deck to the waterline and sometimes as far down as the deadwood at the bow and stern. By inhibiting moisture and preventing dry rot, this procedure could add years to the life of a vessel.[3]

1. "Salt," *Encyclopaedia Britannica*, 11th ed., XXIV, 90; F. C. Lane, *Venice: A Maritime Republic* (Baltimore: The Johns Hopkins University Press, 1973), pp. 58, 132, 144, 323; J. H. Parry, *The Age of Reconnaissance* (Berkeley: University of California Press, 1981), p. 39; H. Pirenne, *Economic and Social History of Medieval Europe*, trans. I. E. Clegg (New York: Harcourt, Brace & Co., 1937), p. 149; A. R. Bridbury, *England and the Salt Trade in the Later Middle Ages* (Oxford: The Clarendon Press, 1955), pp. 76-93, passim; H. A. Innis, *The Cod Fisheries: The History of an International Economy* (2nd ed. rev.; Toronto: University of Toronto Press, 1954), pp. 52-70, 111-19, passim.

2. U.S., Department of the Treasury, *Report on the Foreign Commerce and Navigation of the United States, 1857*, annual statement on foreign imports by customs district, pp. 370-487, passim. [Hereafter cited as *U.S. Foreign Commerce and Navigation Report(s)*.]

3. H. Hall, *Report on the Shipbuilding Industry of the United States* (Washington, Government Printing Office, 1882), p. 102; W. W. Bates, "Ship Timber in the United States," *Report of the U.S. Commissioner*

Ship *Pelican State*, a member of the Bath salt fleet, making her landfall at the conclusion of an 1852 Atlantic crossing. (Courtesy of the Maine Maritime Museum.)

space merely to produce two hundred bushels of salt.[15] The solar method also demanded sunny, dry conditions, and its application was greatly inhibited by coastal Maine's perennial damp, foggy, and rainy climate.

Historical records confirm the inhospitable weather facing the erstwhile Maine saltmaker. In 1838, according to observations made at Portland harbor, well over a third of the days between the first of June and the middle of October—the optimum time of the year—were characterized by fog, precipitation, or overcast skies.[16] Present-day climatology indicates that the Maine coast annually experiences an average of four hundred hours less sunshine and up to sixteen inches more rainfall than Cape Cod. Generally speaking, Maine's maritime weather is 10-15 percent colder, wetter, and cloudier than the weather of comparable areas in southern New England. More to the point, the state's mean annual rate of water evaporation (the essence of solar saltmaking) averages a full one-third less than that of Massachusetts.[17]

As a result of these immutable facts of nature, the few attempts to manufacture salt along the Maine coast were limited to nonsolar operations. There were, for

15. E. J. Ferguson, ed., *Selected Writings of Albert Gallatin* (Indianapolis, Ind.: The Bobbs-Merrill Co., 1967), p. 260.

16. C. T. Jackson, *Third Annual Report on the Geology of the State of Maine* (Augusta, Maine: Smith & Robinson, 1839), pp. 229-37.

17. E. Powers and J. Witt, *Traveling Weatherwise in the U.S.A.* (New York: Dodd, Mead & Co., 1972), pp. 11-16; U.S. Geological Survey, *The National Atlas of the United States of America* (Washington: Government Printing Office, 1970), pp. 96, 102-3.

example, widely scattered saline deposits located inland from the immediate shoreline that were suitable for salt-making. One, a mineral water spring, was discovered at Lubec in the 1830s. Such sources would yield modest amounts of common salt by separating out the water through freezing or boiling.[18] The Eastport Salt Works, Maine's sole existing establishment when domestic salteries were surveyed by the U.S. Treasury Department in 1830, used local mineral or sea water for part of its base stock, producing the necessary evaporation by means of wood fires set under large iron pans. However, most of the firm's supplies took the form of rock salt, imported in a solid state from overseas mines and then dissolved in vats and crystallized by artificial heat. The business was, therefore, effectively tied to the import trade and served principally as a refiner of foreign products delivered by sea in an unprocessed condition.[19]

The Eastport works, Maine's primary salt manufactory, functioned successfully for a number of years. Nevertheless, it had ceased to exist by 1850, at which time the state possessed only three small salteries, all located in Cumberland County and together producing less than ten thousand dollars worth of salt. These firms employed just four workers among them and made barely enough to cover their meagre investments.[20] Their impact on the local economy was necessarily minimal.

There were, of course, domestic sources of supply other than Maine's few struggling boileries and Cape Cod's limited production-for-use, but geographic location rendered them impractical for coastal consumers during the antebellum period. The great interior saline deposits of western New York, southwestern Virginia, and central West Virginia, the source of seven to eight million bushels of boiled brine salt annually around 1850,[21] were simply too far away to be an important factor. "It is . . . apparent," wrote Massachusetts Senator John Davis in an 1840 Congressional report, "that the larger portion of the value of salt consists in the expense of transportation . . . [and] . . . it costs much less to bring it across the Atlantic, than to transport it into the Interior of the United States."[22] Indeed, domestic freight charges alone accounted for a third of the final cost of a bushel of foreign salt shipped upriver at that time from New Orleans to Louisville or Cincinnati.[23] Shipping from the hinterland to the coast was equally expensive, and western salt moving east could not compete in price with imports from Europe or the West Indies, as Syracuse, New York, producers discovered to their frustration in the 1850s.[24] In 1850, European salt could be purchased in eastern seaboard cities for one-third less that what West Virginia salt sold for in neighboring Ohio.[25]

That sort of cost differential and the absence of adequate or dependable local supplies caused fish merchants and other Maine salt consumers to turn almost exclusively to overseas imports and, here again, the state's choice of suppliers distinguished it from other parts of New England. While northern Massachusetts (also dependent upon imports) looked to Spain, Portugal, and the West Indies, Maine looked to the British Isles. During the year 1838, one of the few for which individual commodity imports were statistically delineated by customs district, a majority of the Bay State's salt deliveries arrived from Iberian or Caribbean ports. In the fishing districts, the preference for Spanish salt was especially pronounced. Marblehead, for example, took all of its salt from Spain, and Gloucester obtained two-thirds of its supply from there. Most of Maine's customs districts, conversely, preferred English salt, including the fishing districts of Portland-Falmouth, Penobscot, and Wiscasset. Penobscot District, the center of Maine's cod fishery, purchased two-thirds of its supply from England and only a third from Spain. Well over half of Maine's entire salt consignment for the year originated in Great Britain. Spanish salts were a substantial but decidedly secondary one-fourth of the total, and Spain, Portugal, and the West Indies together satisfied only a little over one-third of the state's 1838 requirement.[26]

18. Jackson, *First Report*, pp. 111-14.

19. *Salt Documents*, pp. 64, 72; see also H. A. Davis, *An International Community on the St. Croix, 1604-1930* (Orono: University of Maine Press, 1950), p. 174.

20. U.S., Department of the Treasury, *Letter on Salt Statistics*, 33rd Cong., 1st Sess., 1854, House Exec. Doc. 36, p. 3.

21. G. L. Eskew, *Salt, the Fifth Element: The Story of a Basic American Industry* (Chicago: J. G. Ferguson & Associates, 1948), p. 93.

22. U.S., Congress, Senate, Select Committee on the Origin and Character of Fishing Bounties and Allowances, *Minority Report*, 26th Cong., 1st Sess., 1840, Sen. Doc. 368, p. 69.

23. *Salt Documents*, p. 50; see also T. H. Benton, *Thirty Years' View* (New York: D. Appleton & Co., 1856), I, 145.

24. Eskew, p. 94.

25. A. H. Cole, *Wholesale Commodity Prices in the United States: 1700-1861: Statistical Supplement* (Cambridge: Harvard University Press, 1938), p. 315.

26. Comparative percentages of 1838 imports to the two states from

Maine's British connection intensified as time passed. Twenty years later, in 1858, only two vessels (378 combined tons) entered Maine ports from Spain compared to thirty-four vessels (24,388 combined tons) from England, and there were no arrivals at all from Portugal.[27] By the 1850s, the Maine salt trade was virtually a British monopoly. The decline of the Spanish trade and the concurrent rise of British commerce was most strikingly illustrated in the eastern district of Penobscot, which had formerly imported small but significant amounts of Cadiz salt on an annual basis through its main entrepôt at Castine. Throughout the entire last half of the 1850s, the district was visited by just one Spanish salt ship, while hosting nearly twenty salt carriers from England.[28]

English salt meant, essentially, Liverpool salt. "Liverpool" was the most visible foreign brand in Maine supply houses from the very beginning. As early as 1829, the fledgling Eastport Salt Works was attempting to duplicate imported Liverpool coarse, the grade ". . . used for the fisheries on this coast."[29] By the 1840s, the Liverpool product was in use among fishermen from Portland to Castine, and by the 1850s those outfitting at the latter place were wetting it to the exclusion of all others.[30]

There are several explanations for the early prominence and ultimate dominance of Liverpool salt in the Maine market, as well as the American market generally. For one thing, it was distinguished from most other imported salts in that it was a rock or mineral salt, mined from underground in a solid state or pumped out as brine and then processed by artificial heat. As such, it was in constant supply. The massive subterranean deposits of Cheshire and vicinity, located conveniently near the port of Liverpool (hence, the name), were capable of supplying eight hundred thousand tons a year by the middle of the nineteenth century. Nearly one hundred manufacturing establishments in the region, using a connecting network of rivers and barge canals as an outlet, were able to furnish Liverpool with sufficient foreign cargoes to make England the world's premier salt exporter. Rock or mineral salt production was limited only by access to cheap fuel supplies, needed to fire the boiling pans. At Cheshire, this problem was neatly solved by the proximity of northwestern England's extensive coal mines, many of which were owned by the salt manufacturers themselves.[31]

Unlike Liverpool's rock salt, the salts entering American markets from the West Indies, the Mediterranean coast, and the Iberian Peninsula—including Maine's favorite Spanish variety from the Bay of Cadiz—were sea salts made from solar evaporation. These solar products were not subject to manufacturing difficulties with regard to labor, materials, or fuel, but they were governed by the forces of nature. To begin with, salt water had a lower saline content than natural brine from rock deposits. Therefore, a greater amount of seawater than mineral brine was required to produce a given amount of salt using a given amount of heat. The ratio, about eight to one in favor of the saltier groundwater, meant that making sea salt was a less practical proposition from the standpoint of mass production.[32]

Problems of volume in the solar manufacturing process were compounded by the elements. The initial advantage of low production costs was substantially cancelled out by unpredictable bouts of bad weather, which periodically halted production at all solar salteries. The resulting lack of adequate and dependable supplies became a hallmark of the southern European salines, in particular, from the Medieval period onward. Saltmaking in that region was frequently held up by wet or cloudy conditions, and the cancellation of supply contracts was not uncommon. Occasionally, orders could not be filled until the following year due to insufficient sunshine.[33]

Such complications carried over into the modern era.

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their primary foreign sources were as follows: Massachusetts—Spain and Portugal (45 percent), British Isles (41 percent), West Indies (7 percent), all others (9 percent); Maine—British Isles (58 percent), Spain and Portugal (30 percent), West Indies (6 percent), all others (6 percent). See *Salt Documents*, pp. 168-69; see also Goode, sec. II, p. 168.

27. *U.S. Foreign Commerce and Navigation Report, 1858*, pp. 588-89.

28. Ibid., 1856-1860, annual statements on entrances and clearances by customs district.

29. *Salt Documents*, p. 72.

30. *Eastern Argus*, advertisement, 3 April 1840; *Bangor* (Maine) *Daily Whig and Courier*, news item, 18 February 1846; Penobscot Marine Museum, General Collection, MS. 125: Journal of Fishing Outfits, William Witherle & Company, 1853. [This collection hereafter cited as PMM, GC.]

31. *Encyclopaedia Britannica*, XXIV, 88-89; *Salt Documents*, pp. 93, 104; R. P. Multhauf, *Neptune's Gift: A History of Common Salt* (Baltimore: The Johns Hopkins University Press, 1978), pp. 111, 117; *Hunt's Merchants' Magazine*, XXVI (April 1852), 520; Hyde, pp. 28, 30; Benton, II, 177.

32. *Encyclopaedia Britannica*, XXIV, 87; Bridbury, pp. 6-7, 46; Multhauf, p. 248; Benton, I, 147; *Salt Documents*, p. 50.

33. Bridbury, pp. 9-10, 50.

In 1855, the ship *Forest State* arrived at Portland from Cadiz with reports that salt was very scarce and distressingly high in price at both the Spanish and Italian salteries. Some vessels, it seemed, had been reluctantly forced to pay steep Spanish prices for hard-to-get cargoes because of a total absence of supplies at nearby Italian depots like Trapani.[34] Late the following year, the same *Forest State* put into Portland with a load of Spanish fishing salt that was described as ". . . the only cargo imported here from Cadiz."[35]

The Spanish and other European solar salteries had by this time reached the practical outer limits of their productive capacity. Always at the mercy of the weather, they were also restricted by the diffuse physical plant—coastal reservoirs, catch basins, and the like—required by their age-old technology. Only so much adaptable shore frontage was available, and as the nineteenth century progressed there was little room for the massive expansion necessary to meet increased demands in North America. Production at the Iberian and Mediterranean salines remained roughly static between 1835 and 1860, while Great Britain's mineral salt production tripled. By the latter year, English salt producers had far outstripped those of Spain, Portugal, and Italy combined.[36]

Added to the problem of the availability of solar salt was the question of its quality. Here the evidence is mixed. Both boiled mineral salt and sea salt had their proponents, and some fishermen, notably those of Massachusetts, preferred the latter above all others as a preservative. Nevertheless, regardless of its curative properties, clean and unadulterated sea salt was hard to obtain. Most solar-produced salt was characterized by a dingy, dirty appearance, the result of impurities and extraneous materials picked up from the sand-, clay-, or wood-lined catch basins in which seawater was captured for evaporation. In addition to its discoloration, solar salt contained sea organisms and was often mixed with assorted wastes and pollutants which came in with the tide and were not filtered out upon entering the reservoirs.[37] As late as 1850, only about a third of the production at the Portuguese-owned Cape Verde Islands, a once-major source of sea salt for New England fishermen, was being subjected to industrial procedures for purification.[38] In contrast, even devotees of solar salt were forced to concede the widespread consumer appeal of the "fair and tempting," pure white, boiled Liverpool product.[39]

All of the aforementioned factors—greater volume production, dependability of supply, superior product purity and appearance—contributed to the gradual takeover of the North American salt market by Liverpool shippers. In Maine, there was one other factor, and it was probably the most important. The prevailing patterns of international maritime trade placed the state in a position whereby the Liverpool connection was not only easy and natural but in all likelihood necessary and inevitable.

In the first place, Maine was diverted from the closer salt depots of the British and Dutch West Indies by the overriding importance of its molasses and sugar trade with the Spanish islands of that region. Salt was always Maine's dominant tonnage import, but molasses was far and away the leader in dollar value.[40] For obvious reasons, therefore, the large down-east fleet of brigs and schooners active in the Caribbean trade tended to neglect salt cargoes in favor of the more lucrative commerce in molasses. There was also the matter of vessel size. To equal the profit gained from delivering a given cargo of Cuban molasses, a larger and much heavier cargo of Turk's Island or Curaçao salt would be needed. That was an impractical option considering the limited capacity of the archetypical Indies trader, which could carry only a few hundred hogsheads of salt compared to the several thousand hogsheads accommodated by the ships and barks commonly employed on the Atlantic run.[41] Undeniable economies of scale militated against the Caribbean salt trade, and West Indian imports never amounted to more than a small minority

34. *Eastern Argus*, marine lists, 22 August and 8 September 1855. Similar shortages at the Portuguese salteries of St. Ubes (Setubal) were reported by Maine ships in 1846. See *Eastern Argus*, marine list, 3 September 1846.

35. Ibid., 7 August 1856, p. 3.

36. Multhauf, p. 242.

37. Bridbury, pp. 50-53; *Salt Documents*, p. 108; *Encyclopaedia Britannica*, XXIV, 88; E. A. Ackerman, *New England's Fishing Industry* (Chicago: University of Chicago Press, 1941), p. 161.

38. Duncan, p. 190.

39. *Salt Documents*, pp. 104-5.

40. *U.S. Foreign Commerce and Navigation Reports*, 1856-1860, annual statements on foreign imports by customs district; see also *Eastern Argus*, news item, 15 October 1853.

41. See, for example, *Eastern Argus*, advertisements, 23 July, 15 August, and 23 November 1853, and 6 May, 2 July, 30 August, 7 September, and 3 November 1859.

of the total salt coming into Maine (or for that matter the United States as a whole) during the nineteenth century. [42] That left European imports to take up the slack.

The choice of Liverpool as Maine's primary European source for salt came about as a result of its strategic role as the chief eastern terminus for two of the leading transatlantic staple trades of the nineteenth century, the commerce in American cotton and in Canadian timber. Both cotton ships from the United States and timber ships from British North America required ballast on their westbound return voyages. Salt—heavy, dense, comparatively cheap, and readily available—filled that need admirably. Moreover, unlike alternative ballast materials such as stone or sand, it had the advantage of being a salable product upon arrival in port, and any small profit above its cost was an added plus for shippers.[43] Gradually, over time, salt became less an item of ballast and more a product of trade, and the carriage of salt cargoes evolved into an end in itself, especially for vessels heading to ports north of Boston. For Maine ships, in particular, the salt run was established early on as a regular leg of the international triangular trade in cotton.

The integration of Maine's Atlantic salt trade with the cotton triangle was exemplified by the port of Castine, the primary salt entrepôt of the Penobscot Bay region and a major fisheries center. The Castine version of the three-sided trade had as its first leg the shipment of fish products to a Deep South port, such as New Orleans or Charleston. The second leg consisted of carrying a load of southern cotton to a European port—usually Liverpool. The third or homeward leg was, of course, the salt run.

The first recorded Castine freighter to complete the fish-cotton-salt triangle was the ship *Canova,* which sailed the circuit via New Orleans in 1823-1824.[44] This trip set a pattern that was followed diligently for more than two decades. As a rule, Castine participants in the triangular trade departed in late fall, a month or two after the close of the fishing season, in order to allow time for curing and otherwise readying the annual catch for market. The return voyage from England was ideally timed for early springtime to facilitate outfitting for the summer fisheries. Owners' instructions to the captain of *Canova* in October 1831 were typical: "Our plan for the ship is that she should take a freight of cotton or other articles from New Orleans to Liverpool and return to this place with a load of Salt as early in the Spring as possible. . . ."[45]

The voyage of the ship *Antioch* in 1835 is generally representative of the operation of the entire Castine salt fleet during the first quarter-century of the town's participation in the southern triangular trade. *Antioch* left Castine in January of that year—a late departure—with 200 boxes of codfish, 350 barrels of mackerel, and a small amount of lumber consigned by the owners of the ship, Messrs. Witherle & Jarvis and Thomas Adams, to the captain for sale in New Orleans. After disposal of the cargo at the best possible price, the vessel sailed for Liverpool in May with 1,500 bales of Delta cotton shipped by two New Orleans merchants to several British importers. In Liverpool, the cotton was exchanged for 470 tons of white salt purchased from Alexander Gordon & Company for *Antioch*'s owners and carried to Castine in late July. Thus, the Castine merchants disposed of their fish, obtained the salt necessary to sustain the next season's fishing, and made an extra profit as shippers on the intervening cotton run.[46]

There were minor variations in the operation of the triangle. Occasionally, when Havre, France, was substituted for Liverpool as a cotton entrepôt, the addition of the nearby Spanish port of Cadiz as a salt depot transformed the triangle into a four-sided route. Two members of the Castine fleet, the ships *St. Leon* and *Lochinvar,* spent the better part of the decade of the 1840s running cotton to Europe and carrying salt to Castine, with nearly half of the trips involving a short fourth leg around the Iberian Peninsula from Havre to Cadiz.[47] A few Castine freighters even ventured into the Mediterranean. At least two ran cotton cargoes to Trieste on the Adriatic and Leghorn on the west coast of

42. *Salt Documents,* pp. 168-69; *U.S. Foreign Commerce and Navigation Reports,* 1830-1890, annual statements on foreign imports by countries.

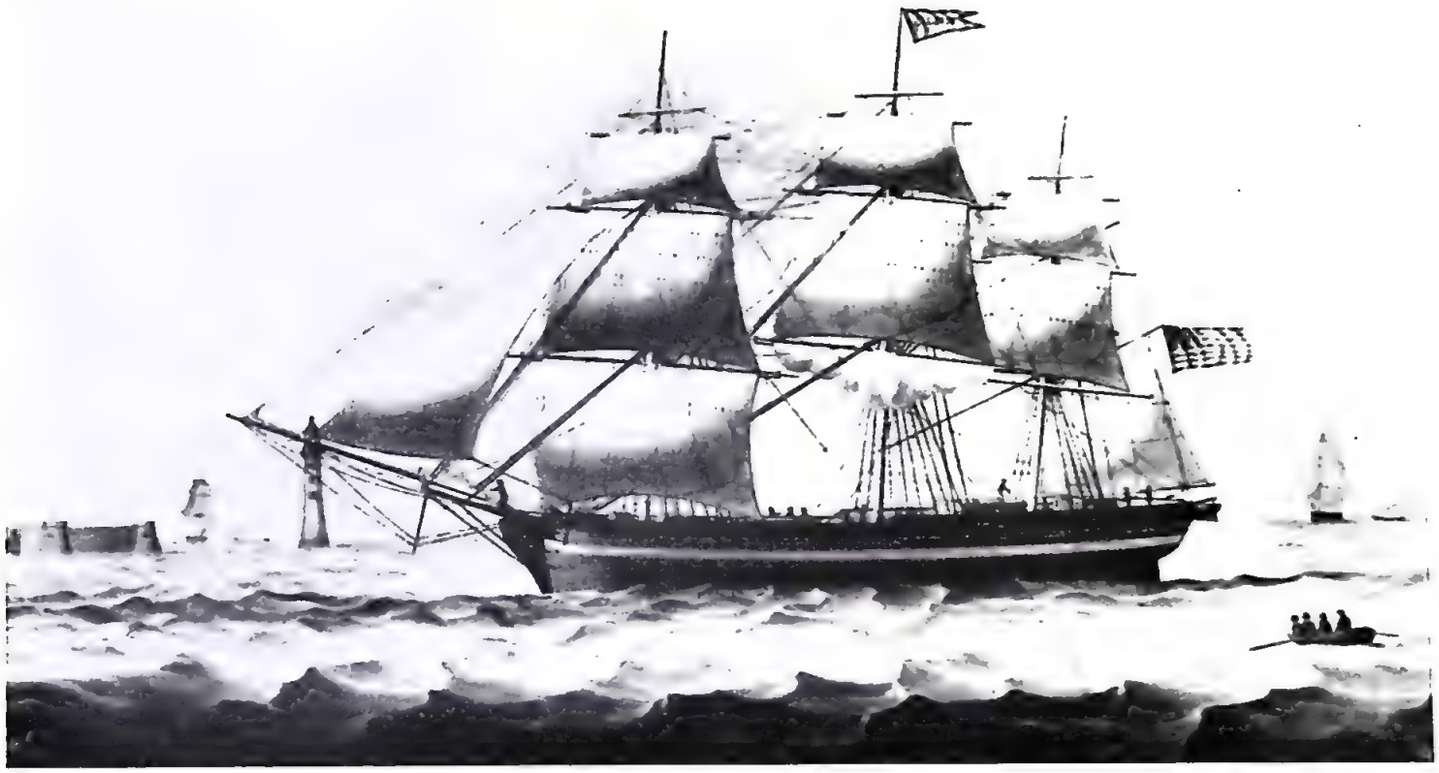
43. *Salt Documents,* p. 104.

44. PMM, WP, Ship *Canova* Collection, box 1, file 4: cargo invoice, Castine to New Orleans, 17 November 1823, captain's letter of instructions, 17 November 1823, and freight bill, New Orleans to Havre, 13 February 1824.

45. Ibid., box 3, file 48: captain's letter of instructions, 20 October 1831.

46. PMM, WP, Ship *Antioch* Collection, box 2, file 26: cargo invoice, Castine to New Orleans, January 1835; ibid., box 2, file 28: freight list, New Orleans to Liverpool, 12 May 1835, and cargo invoice, Liverpool to Castine, 28 July 1835.

47. PMM, WP, Miscellaneous Vessels, box 3, file 1: ships *Lochinvar* and *St. Leon,* cargo invoices and freight lists, 1843-50.



Ship *St. Leon* of Castine entering Liverpool to load salt on her maiden voyage around the Southern triangle in 1835. (Courtesy of the Penobscot Marine Museum.)

Italy, while a third sailed on one trip from New Orleans to Cagliari, an Italian salt depot on the island of Sardinia.[48] The advantages of the British connection were obvious, however. The ability to dispose of a cargo of cotton and obtain a cargo of salt at the same location, the avoidance of additional port charges and lost time, and the use of a familiar language all dictated a preference for Liverpool whenever cotton shipments permitted.

Until the late 1840s, the delivery of salt cargoes to down-east ports essentially followed the classic pattern developed at Castine. Maine ships sailed to the South with cargoes of native products like fish, proceeded to carry cotton to Europe, and then returned home with English or Spanish salt. There were some local modifications in terms of outward-bound cargoes. Lumber, not fish, was the popular freight item for triangular traders heading south from the port of Bath, while hay and ice filled the manifests of other Maine square-riggers on the southern run.[49] These minor discrepancies notwithstanding, there were always two constants. Virtually all of the salt reaching Maine arrived by way of the cotton triangle, and almost all of it was carried in American bottoms. In 1841, for example, twenty-seven of the thirty-one vessels (or 87 percent) entering Maine ports with foreign salt were of American regis-

48. *Eastern Argus*, marine lists, 29 December 1851, 18 January 1853, and 20 March 1858; *Republican Journal* (Belfast, Maine), marine list, 9 April 1852.

49. Baker, I, 247; *Eastern Argus*, marine lists, 4 December 1857, and 4 October, 15 November, and 8 December 1858; *The New England Business Directory, 1860* (Boston: Adams, Sampson & Co., 1860), p. 109.

try.[50] That pattern was shortly to change, and the change was reflected in the career of one of Castine's premier salt carriers.

The ship *Adams* completed the southern triangle seven times in eight years between 1842 and 1849, arriving in Castine in the early fall from the salt depots of Liverpool or Cadiz, and clearing in the late fall for the cotton ports of New Orleans or (on rare occasions) Charleston. *Adams* was a regular trader, departing from the strict three-sided route only to the extent that two cotton trips were sometimes interspersed between runs home to Castine, thus accounting for her late arrivals. Beginning in 1848, however, the vessel began to operate more as a transient, remaining in the cotton trade but abandoning the traditional triangle on occasion to engage in a direct shuttle between New Orleans and Boston. When she did sail the triangle, moreover, *Adams* was increasingly likely to use New York as an American port of entry, rather than her home base. By the early 1850s, the ship was only rarely on the Castine salt run.[51]

Erstwhile Maine salt carriers like the *Adams* were being attracted to more profitable occupations after 1850. The massive emigrant trade out of Liverpool appears to have absorbed a number of them. The Castine ship *William Jarvis*, launched at a local yard in 1848, was specifically designed to handle human freight, one feature of her construction being "... the provision made for securing the thorough ventilation of the whole vessel—thereby promoting the health of passengers and crew. . . ."[52] Adequate ventilation, as Robert G. Albion noted, was a major consideration for ships expected to accommodate great numbers of steerage passengers between decks.[53] Contemporary observers commented on the much larger returns afforded by this form of carriage trade compared to ordinary commerce, and the transporting of immigrant cargoes was without doubt an attractive prospect for any vessel departing Liverpool in the 1850s.[54]

Then, too, the growing tendency to spend more time in the lucrative cotton trade, either by operating on the two-way coastal shuttle or (more commonly) by making multiple voyages on the New Orleans-Liverpool leg of the triangle, meant that fewer Maine vessels were available as salt carriers on a regular basis. For example, none of the six Castine ships sailing the first two-thirds of the cotton triangle in 1853-1854 completed the Maine salt run. Instead, two proceeded to Boston and New York, respectively—at least one with immigrants since she was quarantined—while the remaining four returned directly to New Orleans for second cargoes of cotton, departing again for Liverpool before the end of 1854.[55]

The transient wanderings of the Maine home fleets after circa 1850 severely disrupted the regularized salt import trade based on the southern cotton triangle. Although saline cargoes from that source continued to arrive throughout the antebellum period, they were haphazard at best. Most importantly, spring deliveries could no longer be depended upon, a key requirement in light of the growing size and significance of the Maine sea fisheries during the immediate prewar decade.[56]

In a time of rising demand, the dispersal of local salt ships to other trades could not have been tolerated—the profit in cotton and immigrants notwithstanding—except for the existence of alternate carriers. Salt cargoes continued to come from Liverpool, but now they came in foreign bottoms. During the year ending 30 June 1856, seven of the nine arrivals from England at the eastern salt ports of Penobscot, Frenchman's Bay, and Passamaquoddy districts were foreign vessels. Two years later, that was up to nine out of ten.[57] With few exceptions, these new salt ships flew the flag of Great Britain (Table I).

At Castine, the British takeover of the salt trade

50. U.S., Department of the Treasury, *Statement on Vessels Entering United States Ports in 1841 with Salt Cargoes*, 27th Cong., 3rd Sess., 1842, House Exec. Doc. 20, p. 3.

51. G. W. Blunt White Library of Mystic Seaport, Logbook Collection, Log No. 17: Journal of Captain Moses Gay, ship *Adams*, 1842-1851.

52. *Republican Journal*, marine list, 25 August 1848.

53. R. G. Albion, *The Rise of New York Port, 1815-1860* (New York: Charles Scribner's Sons, 1939), p. 342.

54. H. Melville, *Redburn: His First Voyage* (New York: Harper & Brothers, 1863), p. 303. Profits were such that at least one salt ship initially advertised as loading for Portland was rerouted at the last minute to New York when a sizeable human cargo suddenly became available. See *Eastern Argus*, marine lists, 14 May and 15 September 1853, and *The Morning News* (Saint John, N.B.), marine list, 8 August 1853.

55. Ships *Adams*, *John H. Jarvis*, *Ostervald*, *Lochinvar*, *William Witherle*, and *J. P. Whitney*. See Castine (Maine) Town Office, MS: Tax Valuation Book for 1854; see also *Eastern Argus*, marine lists, 1 November 1853 to 1 November 1854, passim.

56. W. M. O'Leary, "The Maine Sea Fisheries, 1830-1890: The Rise and Fall of a Native Industry" (Ph.D. dissertation, University of Maine at Orono, 1981), pp. 585-93.

57. *U.S. Foreign Commerce and Navigation Report, 1856*, p. 584; ibid., *1858*, p. 588.

Table I

REGISTRIES OF SALT SHIPS ARRIVING AT MAINE PORTS FROM LIVERPOOL, 1851-1860*

	Total Arrivals	*American Registry*	*British Registry*	*Other Registry*	*Registry Unknown*
1851	27	7 (26%)	19 (70%)		1 (4%)
1852	27	6 (22%)	18 (67%)		3 (11%)
1853	21	4 (19%)	13 (62%)	1 (5%)	3 (14%)
1854	29	6 (21%)	16 (55%)	1 (3%)	6 (21%)
1855	22	12 (55%)	9 (41%)		1 (4%)
1856	28	9 (32%)	17 (61%)		2 (7%)
1857	17	7 (41%)	8 (47%)	1 (6%)	1 (6%)
1858	16	8 (50%)	8 (50%)		
1859	17	8 (47%)	7 (41%)	1 (6%)	1 (6%)
1860	25	10 (40%)	15 (60%)		
Total	229	77 (34%)	130 (57%)	4 (2%)	18 (8%)
Yearly Average	23	8 (35%)	13 (56%)	-1 (0%)	2 (9%)

*Sources: *Eastern Argus* (Portland, Maine), *Republican Journal* (Belfast, Maine), *The Morning News* (Saint John, N.B.), *Ellsworth* (Maine) *Herald* and *Eastport* (Maine) *Sentinel*, marine lists, 1851-1860, passim; *American Lloyd's Registry of American and Foreign Shipping, 1862* (New York: E. & G. W. Blunt, 1862), passim; *Lloyd's Register of British and Foreign Shipping* (annual), 1850-1860 (London: Cox & Wyman, 1850-1860), passim; W. A. Baker, *A Maritime History of Bath, Maine and the Kennebec River Region* (Bath, Maine: Marine Research Society of Bath, 1973), II, 813-1010; L. Manny, *Ships of Miramichi* (Saint John, N.B.: The New Brunswick Museum, 1960), pp. 75-84; F. W. Wallace, *Record of Canadian Shipping* (Toronto: The Musson Book Co., 1929), passim; L. Colcord (comp.), "Record of Vessels Built on Penobscot River and Bay" in *Sailing Days on the Penobscot*, by G. S. Wasson (Salem, Mass.: Marine Research Society, 1932), pp. 215-440; E. C. Wright, *Saint John Ships and Their Builders* (Wolfville, N.S.: private printing, 1976), pp. 172-88.

began in the late 1840s, the first recorded participants being the bark *Lord Elgin* and the brig *Avon*, both of Liverpool, which arrived in the spring of 1848. Prior to that time, the two thousand or so tons of foreign salt annually deposited in Castine's salt sheds had been delivered exclusively in locally owned ships.[58] By the turn of the decade, William Witherle & Company, the town's leading salt import firm, was carrying on an established commerce with such Liverpool exporters as Jeffreys & Darcy, Willis & Company, and Dean Brothers, virtually all of it in British carriers.[59]

58. *Bangor Daily Whig and Courier*, news item, 18 February 1846; *Republican Journal*, marine list, 14 April 1848; *The Morning News*, marine list, 1 May 1848; *Lloyd's Register of British and Foreign Shipping, 1847, 1848* (London: J. & H. Cox, 1847 and 1848).

59. PMM, WP, Miscellaneous Vessels, box 3, file 11: ship *Elizabeth Grange*, barks *Colchester*, *British Empire*, and *Rectitude*, and brigs *Waltron* and *Palmerston*, cargo invoices, Liverpool to Castine, 1849-1851; see also *Lloyd's Register of British and Foreign Shipping, 1849* (London: J. & H. Cox, 1849), passim.

An identical pattern emerged elsewhere in Maine at about the same time. As the 1850s began, nearly every salt port in the state from Portland to Eastport was being served by British shipping. There were exceptions. Bath, for instance, continued to depend on its own fleet, but outside carriers were the general rule. In 1851, at least 70 percent of the vessels bringing salt cargoes into Maine were of foreign registry, an almost exact reversal of the situation prevailing a decade earlier. Throughout the entire ten-year period 1851-1860, only about a third of Maine's annual Liverpool salt fleet was composed of American ships (Table I). In that respect, the state was strikingly atypical. Most of the salt imported into the United States during the pre-Civil War years came in American bottoms—75 percent of it in 1856, for example.[60] By way of contrast, the American component of the Maine salt fleet in 1856 was barely 32 percent, with British carriers making up the balance (Table I).

The unique character of the Maine trade was due to the state's geographic proximity to one of Britain's primary shipping routes. The British ships dominating the Maine salt trade in the 1850s were not participants in the southern cotton triangle. They were, in fact, effectively barred from it by section 4 of the Navigation Act of 1817, which prohibited foreign vessels from carrying domestic cargoes between American ports and thereby reserved the coastwise portion of the cotton circuit for ships of United States registry.[61] Instead of sailing south for cotton, British salt carriers headed north from the Maine ports to take part in the timber trade between Canada and the United Kingdom. In doing so, they created a second triangular route—what might be called the northern or timber triangle.

The existence of a transatlantic commerce between Great Britain and her North American colonies, consisting of timber cargoes traveling eastward and salt shipments moving westward, has long been known to Canadian historians, but it has been regarded as exclu-

60. *U.S. Foreign Commerce and Navigation Report, 1856*, p. 292.

61. C. Abbott, *A Treatise of the Law Relative to Merchant Ships and Seamen* (4th Amer. ed.; Boston: Hilliard, Gray, Little & Williams, 1829), pp. 540-41; see also E. R. Johnson, et al., *History of Domestic and Foreign Commerce of the United States* (Washington: Carnegie Institution, 1915), I, 336.

Table III

SUBSEQUENT DESTINATIONS OF VESSELS IN THE LIVERPOOL-MAINE SALT TRADE, 1851-1860*

Salt Entrepôt	*To Canadian Timber Ports*	*To American Cotton Ports*	*To Liverpool (direct return)*	*To Other Ports*[1]	*Total Recorded Voyages*[2]
Portland	34 (61%)	14 (25%)	6 (11%)	2 (3%)	56 (100%)
Bath	5 (28%)	11 (61%)		2 (11%)	18 (100%)
Wiscasset	1 (20%)	4 (80%)			5 (100%)
Camden	5 (46%)	2 (18%)		4 (36%)	11 (100%)
Bucksport	7 (70%)	2 (20%)		1 (10%)	10 (100%)
Castine	25 (76%)	5 (15%)		3 (9%)	33 (100%)
Eastport	13 (81%)		3 (19%)		16 (100%)
Other[3]	3 (100%)				3 (100%)
Statewide	93[a] (61%)	38[b] (25%)	9 (6%)	12 (8%)	152 (100%)

*Sources: See Table II.

1. Primarily West Indies.
2. Based on known subsequent destinations for 152 out of 229 recorded salt voyages.
3. Belfast and Sullivan.

a. Leading individual timber ports: Saint John (48); St. Stephen (20); Quebec City (5); St. Andrews (5).

b. Leading individual cotton ports: New Orleans (16); Savannah (7); Apalachiola (6); Charleston (5).

those continuing on the triangle, and carried to Maine and other northern New England ports in time to facilitate the fall mackerel fishery in the Gulf of St. Lawrence. At this juncture a minority of the vessels, the roughly one-quarter of American salt ships that had chosen to engage in the timber rather than the cotton trade following the season's first salt run (Table IV), returned to the cotton triangle and headed south to spend the winter months in warmer waters. The British salt contingent remained in the timber trade, completing two and occasionally three full circuits before the onset of winter. Following a short layover in Liverpool during December and January (or a two-way trip to one of the American cotton ports, time permitting), activity resumed, as the British timber fleet, joined by the incoming American cotton fleet just completing its winter run on the southern triangle, made ready for another season's departure for the salt ports.[63]

63. The preceding generalizations were based on the movements of nearly one hundred salt ships active on the timber triangle between 1851 and 1860, as traced through contemporary newspaper marine lists. See *Eastern Argus*, *Republican Journal*, *The Morning News*, *Montreal Gazette*, *Eastport* (Maine) *Sentinel*, and *Ellsworth* (Maine) *Herald*, marine lists, 1851-1860, passim.

The creation of the northern triangle was made possible by two external developments unrelated to Maine's need for additional salt carriers but perfectly timed to fill that need. The first was an upsurge in British demand for Canadian timber in the late 1840s coupled with the 1849 repeal of Britain's navigation acts, which together ushered in a boom period in the British North American timber trade during the 1850s. Repeal, in particular, stimulated the trade by opening provincial timber ports to competitive foreign vessels, resulting in reduced transatlantic freight rates and lower prices for Canadian wood in the British market. By 1850, two-thirds of the United Kingdom's timber imports were coming from British North America, and over the ensuing decade thirty-two additional acres of timber docks were constructed at the port of Liverpool to accommodate incoming cargoes.[64]

The second development, linked to the first, was the

64. Lower, pp. 100, 114-22, 257-60; U.S., Department of the Treasury, *Report on the Trade and Commerce of the British North American Colonies and of the Great Lakes and Rivers*, by I. D. Andrews, 32nd Cong., 1st Sess., 1852, Senate Exec. Doc. 112, pp. 616-17. [Hereafter cited as *Andrews Report*.] Hyde, p. 82.

Table IV

COMPARATIVE TRIANGULAR ROUTES OF BRITISH AND AMERICAN SHIPS IN THE LIVERPOOL-MAINE SALT TRADE, 1851-1860*

	British Registry Vessels[1]				*American Registry Vessels*[2]			
	Timber Triangle	*Cotton Triangle*	*Other Routes*[a]	*Total Voyages*	*Timber Triangle*	*Cotton Triangle*	*Other Routes*[b]	*Total Voyages*
1851	9			9		4		4
1852	7			7	1	4		5
1853	8		1	9	1	1		2
1854	9		1	10	2	3	1	6
1855	3		1	4	5	4		9
1856	10		1	11	4	3	1	8
1857	6		1	7		5	1	6
1858	5			5	2	5	1	8
1859	4			4		4	3	7
1860	7		4	11	2	5	2	9
Total	68 (88%)	0 (0%)	9 (12%)	77 (100%)	17 (27%)	38 (59%)	9 (14%)	64 (100%)

*Sources: See Table II.

1. Based on known subsequent routes for 77 out of 130 recorded voyages by British salt ships to Maine ports.
2. Based on known subsequent routes for 64 out of 77 recorded voyages by American salt ships to Maine ports.

a. Direct returns to Liverpool.

b. Primarily West Indies trade.

concurrent rise of Canadian shipbuilding, which produced an expanded pool of transatlantic freighters available to carry timber and, incidentally, Maine salt. As A. R. M. Lower pointed out, nineteenth-century shipbuilding in Canada was closely related to exports of timber.[65] When those exports rose, as they did in the 1840s and 1850s, importers at places like Liverpool required larger fleets. A differential of at least 15 percent between costs at British and Canadian shipyards led them to contract with the latter to more cheaply satisfy their needs. In the mid-1830s, close to half of all the ships sailing out of Liverpool were already Canadian-built.[66] By the 1840s, Liverpool had become the leading market for vessels built at the New Brunswick port of Saint John, that province's dominant building center, and by mid-century Liverpool merchants were taking more than half of the Saint John tonnage produced annually for outside ownership.[67]

65. Lower, p. 262.

66. Hyde, p. 39.

67. E. C. Wright, *Saint John Ships and Their Builders* (Wolfville, N.S.: private printing, 1976), p. 16.

Canadian-built ships became a commonplace feature of the Maine salt trade in the era of the timber triangle. Approximately half of all the salt ships visiting Maine ports in the 1850s were built in Canada, most of them products of shipyards in the Maritime Provinces. New Brunswick and Nova Scotia carriers alone outnumbered the entire fleet of American-built ships delivering salt to Maine during the period. These provincial vessels made up the overwhelming bulk of the salt ships flying the British flag, including two-thirds of those sailing out of English ports as well as the entire native contingent hailing from ports in the Maritimes (Table V). The largest proportion (slightly less than half) were barks, the favorite British rig in the transatlantic trade and a striking contrast to the American preference for ship-rigged vessels. A considerable number, however, were small brigs, a rig that rarely appeared in transatlantic salt trading under American registry (Table VI).

In certain respects, the Canadian-built vessels predominating on the northern triangle were the quintessential salt ships. As timber "droghers," they were de-

Table V

HOME PORTS AND BUILDING SITES OF VESSELS IN THE LIVERPOOL-MAINE SALT TRADE, 1851-1860*

Home Ports[1]		*Building Sites*[2]	
Total Identified	148 (100%)	Total Identified	154 (100%)
United Kingdom[a]	59 (40%)	United Kingdom[d]	20 (13%)
England	50	England	16
Ireland	6	Scotland	3
Scotland	2	Ireland	1
Wales	1	British North America[e]	73 (47%)
British North America[b]	30 (20%)	New Brunswick	43
New Brunswick	16	Nova Scotia	22
Nova Scotia	14	Prince Edward Island	6
Continental Europe	3 (2%)	Other Provinces	2
Germany	1	Continental Europe	3 (2%)
Norway	1	Germany	1
Finland	1	Norway	1
United States[c]	56 (38%)	Finland	1
Maine	48	United States[f]	58 (38%)
Massachusetts	5	Maine	52
Other States	3	Massachusetts	3
		New Hampshire	3

*Sources: See Table I.

1. Based on home ports for 148 out of 191 recorded salt vessels.
2. Based on building sites for 154 out of 191 recorded salt vessels.
a. Leading individual ports: Liverpool, Eng. (28); Hull, Eng. (3); Newcastle, Eng. (3).
b. Leading individual ports: Saint John, N.B. (14); Windsor, N.S. (6); Yarmouth, N.S. (5).
c. Leading individual ports: Bath, Maine (22); Portland, Maine (6); Boston, Mass. (5).
d. Leading individual site: Sunderland, Eng. (6).
e. Leading individual sites: Saint John, N.B. (19); Yarmouth, N.S. (5); St. Martins, N.B. (5).
f. Leading individual sites: Bath, Maine (19); Richmond, Maine (5); Brunswick, Maine (4).

signed to accommodate massive cargoes of squared logs and planking of pine or spruce that took up enormous space but were comparatively light. For this work, they were made relatively wall-sided and flat-bottomed with unusual depths-of-hold to maximize cargo space. Deep draft was not a problem, since the timber harbors of New Brunswick and Quebec provided substantial clearance.[68] The average dimensions of twelve ships and ten barks, all Canadian-built and active on the Maine salt run, suggest the characteristics of the type. The combined measurements of each group, 156'x31'x21' and 139'x28'x19', respectively, provided for average depths that were two-thirds the vessels' maximum beams.[69] That was in keeping with the proportions Canadian authority F. W. Wallace considered typical of the deep-draft and full-bodied timber-drogher of the 1850s.[70] By way of contrast, the half-model of a typical Castine-built ship plying the southern triangle, *William Witherle* (876 tons; 162'x34'x17'), launched in 1851, shows none of the standard timber-drogher characteristics. Instead of flat

68. *Andrews Report*, pp. 416, 420, 508-10.

69. Ships *Edward Johnston, The Black Douglas, Rover's Bride, Canada, Madras, Britannia, Montezuma, Kalos, Queen, Morning Star, Paxton,* and *Ocean Bride;* barks *Clyde, Blanche, Laconic, Agnes, Rubin, Thomas Killam, Monsanito, Abby Craig, The Queen,* and *Mary Leonard.* See *Eastern Argus,* marine lists, 1851-1860, passim, and F. W. Wallace, *Record of Canadian Shipping* (Toronto: The Musson Book Co., 1929), passim.

70. Wallace, *Wooden Ships and Iron Men,* p. 57.

Table VI

CHARACTERISTICS OF VESSELS IN THE LIVERPOOL-MAINE SALT TRADE, 1851-1860*

Rig[1]		*Average Tonnage*[2]	
Entire Fleet:		Entire Fleet:[a]	
Ships	84 (46%)	All vessels	577
Barks	69 (38%)	Ships	778
Brigs	29 (16%)	Barks	452
Total	182 (100%)	Brigs	221
British Registry:		British Registry:[b]	
Ships	35 (34%)	All vessels	524
Barks	45 (43%)	Ships	781
Brigs	24 (23%)	Barks	462
Total	104 (100%)	Brigs	219
American Registry		American Registry:[c]	
Ships	47 (72%)	All vessels	664
Barks	17 (26%)	Ships	775
Brigs	1 (2%)	Barks	347
Total	65 (100%)	Brigs	198

*Sources: See Table I.

1. Based on rigging data for 182 out of 191 recorded salt vessels.
2. Based on tonnage figures for 152 out of 191 recorded salt vessels. All of the American and most of the British vessels in the sample were registered in old measurement (o.m.) tonnage. A minority of the British vessels were registered under the new measurement (n.m.) system, which went into effect in Great Britain in 1855 and resulted in a 10-15 percent average decrease in registered tonnage. See E. C. Wright, *Saint John Ships and Their Builders* (Wolfville, N.S.: private printing, 1976), p. 21, and R. G. Albion, *Square-Riggers on Schedule* (Princeton, N.J.: Princeton University Press, 1938), p. 298.

a. From tonnages for 74 ships, 56 barks and 22 brigs.
b. From tonnages for 33 ships, 38 barks and 20 brigs.
c. From tonnages for 41 ships, 16 barks and 1 brig.

sides and a straight sheer, the model exhibits well-rounded sides and a pronounced sheer, combined with a depth of midsection one-half the beam and a relatively shallow draft for negotiating Mississippi River sandbars encountered on the cotton run.[71]

The great depth and carrying capacity of the eastern Canadian droghers was made possible in part by their buoyancy, a function of the wood entering into their construction. An examination of the building materials used in the hulls of several Maritime-built vessels in the Maine salt trade reveals hackmatack (tamarac), spruce, and birch to have been the most commonly employed woods. The bark *Laconic,* which delivered salt cargoes to several Maine ports between 1851 and 1855, was rather typical. Launched at St. Andrews, N.B., in 1847, she contained hackmatack, spruce, birch, and white pine timbers.[72] These species possessed cubic weights that were considerably below those of white oak and yellow pine, the most prevalent woods used in American shipyards, giving them a correspondingly higher specific gravity.[73] Throughout the 1840s and well into the 1850s, light and tough hackmatack was the favorite shipbuilding material in Atlantic Canada, and in the informed opinion of Henry Hall, "... a large vessel built completely of this wood would carry at least 300 tons more freight than an oak-built ship."[74] The Lynch Report of 1870 confirmed that judgment, citing evidence that Canadian softwood ships of hackmatack or spruce sat higher in the water than their American hardwood counterparts and could carry 15 to 25 percent more deadweight cargo.[75]

This latter point was of critical importance in the salt trade, which placed imposing demands on vessel capacity. Salt was among the heaviest of cargoes, a fact that made it initially popular as ballast material but a highly risky freight proposition for older vessels, especially in stormy seasons of the year. An owner of the ten-year-old Castine ship *St. Leon,* urging caution upon his business partner concerning a pending salt delivery from Cadiz, wrote in 1845, "My own view is ... that the ship getting now to be ancient should bring a small cargo—say 700 tons."[76] The owner's fears were well founded though premature. *St. Leon* arrived safely

71. Penobscot Marine Museum model collection, model no. 529; L. Colcord, comp., "Record of Vessels Built on Penobscot River and Bay" in *Sailing Days on the Penobscot,* by G. S. Wasson (Salem, Mass.: Marine Research Society, 1932), p. 317. For the lines of a representative New Brunswick timber drogher, see the plan of the ship *Marco Polo,* reproduced in D. MacGregor, *Merchant Sailing Ships, 1850-1875* (Annapolis, Md.: Naval Institute Press, 1984), p. 48.

72. *Lloyd's Register of British and Foreign Shipping, 1850* (London: J. & H. Cox, 1850); *Republican Journal,* marine lists, 15 August 1851, and 25 June 1852; *Eastern Argus,* marine lists, 20 May 1854 and 16 April 1855. See also construction materials for ships *America, The Black Douglas, Joseph Howe,* and *Kingston,* barks *Amelia, Cluny, Charles Walton, The Queen,* and *Canada,* and brigs *Waltron, Huron, Milo,* and *Victor: Lloyd's Register of British and Foreign Shipping,* 1850-1860, passim.

73. Hall, pp. 64, 87, 246, 249.

74. Ibid., p. 247; see also *Andrews Report,* p. 522, and Wallace, *Wooden Ships and Iron Men,* pp. 27-28.

75. *Lynch Report,* pp. 228-29.

76. PMM, WP, Miscellaneous Vessels, box 3, file 12: letter from Thomas Adams to William Witherle, 28 February 1845.

from her 1845 voyage with the prescribed "small" cargo (330 lasts or 660 tons), but six years later she sprang a leak and sank while trying to make Castine from Cadiz with 780 tons of Spanish salt aboard, a load that exceeded her registered tonnage by about half.[77]

The ships in the Maine salt trade invariably carried cargoes in excess of their tonnage, an economic necessity in view of salt's comparatively low value relative to its weight. This imperative made the Canadian-built carriers with their buoyant and cavernous hulls the North Atlantic's natural salt ships. The Bluenose bark *Avon* (648 tons) of Windsor, N.S., for example, sailed for Castine and Quebec on her maiden trip around the timber triangle in 1857 with 1,000 tons of Liverpool salt, a cargo more than one and one-half times her tonnage.[78] Equally impressive was the capacity of the New Brunswick-built *Favorite,* a ship of classic drogher proportions (661 tons; 159'x33'x20'), which brought 1,040 tons of salt into Portland from Liverpool in 1860 on her way around the triangle. That constituted a tonnage-to-cargo ratio of nearly 1 to 1.6.[79]

American salt vessels eventually loaded comparable cargoes, as a class of hardwood-built but capacious ships began to be turned out by New England shipyards specifically for the timber trade, spurred on by the opening of Canadian ports to foreign vessels in 1849. One Maine-built timber drogher was the one-thousand-ton *Hezekiah Williams,* launched by Bryant & Lee of Castine in 1856 for the salt import firm of Witherle & Company. Though laid down at a local yard, the new vessel was a product of the noted Boston clipper designer, Samuel Hart Pook, who contracted to produce a half-model and moulds based on the full lines of an anonymous but reputably "stiff" ship. The result was a deep and burdensome carrier measuring 160'x 37'x24'6", ideal proportions for the salt and deal trades.[80] *Hezekiah Williams* was immediately sent north to Saint John for timber on her maiden voyage, but sadly came to grief along the Nova Scotia coast on the return passage from Liverpool and never lived to deliver a cargo of salt.[81] She was testimony, nevertheless, to the growing importance attached to the northern triangle by American merchants in the years immediately preceding the Civil War.

Vessels like the ill-fated *Hezekiah Williams* and her more fortunate counterparts were capable of handling enormous saline cargoes. With them, transatlantic salt carriage reached its quantitative pinnacle. In the mid-eighteenth century, English sack ships of 100 to 150 tons plying between Europe and Newfoundland had averaged 80 to 100 tons of salt per voyage.[82] By the 1820s, 300-ton ships in the Castine fleet were delivering about 350 tons per trip from Liverpool, and by the 1840s that had increased to around 750 tons, roughly a third above average vessel tonnage.[83] A decade later, when the trade reached its peak, individual salt cargoes were approaching 1,000 tons, and shipments that exceeded vessel tonnage by 50 percent were common (Table VII).

By and large, vessels in the Maine transatlantic salt trade carried salt and little else on their incoming passages, an exclusivity dictated by the state's all-important deep-sea fisheries. There were, however, local variations that bred exceptions to the general rule. Portland, the most cosmopolitan of the Maine salt ports, also had the most diverse supplementary cargoes. Iron, coal and crockery were sometimes added to the city's saline shipments from Liverpool, as well as small clusters of emigrants.[84] Portland's trade in human freight was modest compared to cities like New York or Boston, whose transatlantic immigrant ships were apt to carry steerage passengers numbering in the hundreds. Nevertheless, Maine's largest city absorbed over twenty-five thousand aliens between 1820 and 1860, making it the seventh leading American immigration port. Arrivals averaged better than six hundred persons annually during the antebellum period and ex-

77. Ibid., box 3, file 2: ship *St. Leon,* cargo invoice, Cadiz to Castine, 12 August 1845; *Eastern Argus,* marine lists, 14, 15 November 1851; Colcord, p. 315.

78. *Eastern Argus,* marine lists, 31 March, 22, 23 April, and 20 June 1857; *Montreal Gazette,* marine lists, 20 June and 18 July 1857; *American Lloyd's Registry of American and Foreign Shipping, 1862* (New York: E. & G. W. Blunt, 1862), p. 128.

79. *Eastern Argus,* marine lists, 19 May and 18 June 1860, and advertisement, 22 May 1860; *The Morning News,* marine lists, 27 June and 22 August 1860; Wallace, *Record of Canadian Shipping,* p. 104.

80. PMM, WP, Miscellaneous Vessels, box 1, file 39: letters from Samuel H. Pook to Witherle & Company, 4, 14 September 1855, and from Witherle & Company to Pook, 17 September 1855; *Eastern Argus,* marine list, 2 August 1856.

81. *Eastern Argus,* marine lists, 15 September, 2 October, and 15 November 1856, and 23 January and 11 February 1857; *The Morning News,* marine lists, 10, 29 September 1856.

82. Innis, *The Cod Fisheries,* p. 180.

83. PMM, WP, Miscellaneous Vessels, box 3, files 1, 2, 11: ships *Articus, Lochinvar, St. Leon,* and *Adams,* cargo invoices, 1821-1848; Colcord, pp. 313, 315; *American Lloyd's Registry, 1862,* p. 63.

84. *Eastern Argus,* marine lists, 2 June 1853 and 14 February 1857; ibid., advertisement, 3 April 1858.

Table VII
RATIOS OF VESSEL TONNAGE TO CARGO TONNAGE IN THE LIVERPOOL-PORTLAND SALT TRADE, 1851-1860*

Vessel	*Year*	*Vessel Tonnage*	*Salt Tonnage*[a]	*Ratio of Vessel to Cargo Tonnage*
Bark *Derby*	1851	347	392	1:1.13
Bark *Grace*	1852	399	560	1:1.40
Bark *Agnes*	1852	541	700	1:1.29
Ship *Tamerlane*	1855	924	1,400	1:1.52
Ship *Elizabeth Bibby*	1856	686	840	1:1.22
Ship *Sciota*	1856	864	1,400	1:1.62
Bark *Thomas Killam*	1857	569	840	1:1.48
Ship *New England*	1857	922	1,400	1:1.52
Ship *Lombard*	1858	1,083	1,100	1:1.02
Ship *Kalos*	1859	861	1,320	1:1.53
Bark *Adeline C. Adams*	1859	399	400	1:1.00
Ship *Old England*	1859	917	1,232	1:1.34
Bark *Mary Leonard*	1860	634	840	1:1.32
Bark *Annie Kimball*	1860	595	1,120	1:1.88
Ship *Favorite*	1860	661	1,040	1:1.57
Average (15 Shipments)		693	972	1:1.40

*Sources: *Eastern Argus* (Portland, Maine), marine lists and advertisements, 1851-1860, passim; *American Lloyd's Registry of American and Foreign Shipping, 1862* (New York: E. & G. W. Blunt, 1862), passim; *Lloyd's Register of British and Foreign Shipping, 1851, 1860* (London: Cox & Wyman, 1851 and 1860), passim; F. W. Wallace, *Record of Canadian Shipping* (Toronto: The Musson Book Co., 1929), pp. 5, 104, 148, 185, 271; W. A. Baker, *A Maritime History of Bath, Maine and the Kennebec River Region* (Bath: Maine: Marine Research Society of Bath, 1973), II, 830, 833, 910; L. Colcord, comp., "Record of Vessels Built on Penobscot River and Bay" in *Sailing Days on the Penobscot*, by G. S. Wasson (Salem, Mass.: Marine Research Society, 1932), p. 367.

a. Converted from deliveries measured in hogsheads and bags at rate of 1 hhd./560 lbs. and 1 bag/200 lbs.

ceeded one thousand in some of the peak years of the 1840s and 1850s.[85] At least some of that influx arrived aboard vessels plying the northern triangle. In June 1853, for example, the British ships *Gipsey* and *Edward Johnston* put into Portland from Liverpool with thirty-one and forty-seven passengers, respectively, complementing their salt cargoes.[86]

Maine salt ports farther to the eastward did not concern themselves with the immigrant trade but did add other items to their saline cargoes. Bath, a shipbuilding center, emphasized iron and iron products. English iron, consisting of bars for strapping wooden hulls as well as raw material for forging iron knees, went into Bath-built ships in significant amounts during the 1850s.[87] That supply came largely by way of the salt trade. The Bath ship *Maine*, wrecked at the mouth of the Kennebec River in November 1853 while inward bound from Liverpool on the cotton triangle, carried five hundred tons of iron in addition to her five hundred tons of salt. The former was consigned to several of Bath's prominent shipbuilders and included over one hundred tons in the form of anchors and anchor chains.[88]

The most universal supplementary cargo was coal,

85. Albion, p. 418.
86. *Eastern Argus*, marine lists, 2 June and 19 July 1853.
87. Hall, p. 102.
88. *Eastern Argus*, marine lists, 21, 22 November 1853.

Liverpool's second most important export after salt and the commodity that provided freight for the middle leg of the timber triangle. Most Maine salt ships sailing out of Liverpool loaded coal at one time or another, including those bound for Portland and Bath, but coal consignments were especially common aboard salt carriers heading for the more easterly Penobscot Bay ports.[89] The reason was the close involvement of the Penobscot salt entrepôts with the northern triangle and the intimate trade relationship between the ports of Castine and Saint John.

With a few exceptions, the coal shipped to western Maine ports was intended for local consumption. The coal portion of the cargo of the Liverpool ship *Queen of the Lakes*, for instance, which brought 450 tons of salt and 150 tons of bituminous "nut coals" into Portland in 1858, was immediately sold for gas lighting and blacksmithing.[90] In contrast, the coal carried aboard Penobscot Bay salt ships never left the hold until reaching a Canadian port. It was contracted for in advance by importers at Saint John or Quebec (chiefly the former) and delivered on the second leg of the timber triangle.[91]

The port of Saint John was particularly dependent on Liverpool for its coal supply. Regional exports of bituminous Nova Scotian and Cape Breton Island coal went mostly to New York and the New England states, while the small amounts of Pennsylvania anthracite imported to Saint John were used by steamboats and foundries, leaving a ready demand for domestic heating supplies.[92] This demand was satisfied by the cannel or gas coal produced in Lancashire near the Cheshire salt mines and carried out of Liverpool as a secondary cargo aboard westbound transatlantic salt ships, either via direct shuttle or by way of the northern triangle.[93] Since two-thirds of the Penobscot-bound salt carriers—and three-quarters of those bound for Castine—plied the timber triangle, they became obvious candidates for coal carriage (Table III). Over half of all Castine salt deliveries during the period 1851-1860 were followed by a second leg north to Saint John, and about one-third of those involved cargoes of Liverpool coal.[94]

Tradition and common sense dictated that when secondary freight was carried about salt ships, whether coal or other commodities like iron, hardware, or dry goods, certain stowage rules applied. Whatever the cargo mix, the heavy salt portion was always placed in the lower hold for maximum stability. The balance went between decks (if a two-decked vessel) or on the main deck. This was a practice begun by the Venetians, whose ship captains from the fourteenth century on always placed their salt as low as possible, beneath cotton and other lighter wares, in order to balance their cargoes. The same rule held true in the era of the eighteenth-century Newfoundland sack ship trade, when salt supplies served to ballast westbound cargoes that included fishing gear, foodstuffs, and other miscellany.[95]

By the nineteenth century, salt cargoes took basically two forms, bulk shipment and delivery in cloth sacks or bags. The largest amounts by far entering the Maine market came in bulk, unpackaged and simply piled loose in the hold. This was the method of stowage observed at Liverpool in 1839 by Herman Melville, who later described the picturesque fleet of small, red-sailed sloops, loaded to capacity with loose salt, which ferried the refined product downriver directly from the salteries to the waiting vessels. "These little fellows," he wrote, "were continually coming in with their cargoes for ships bound to America; and lying there five or six together, alongside those lofty Yankee hulls, resembled a parcel of red ants about the carcass of a black buffalo."[96]

Bulk shipments remained the rule at Maine salt entrepôts throughout the 1840s and 1850s, although they were often supplemented by smaller amounts packed in two-hundred-pound sacks of about three bushels each. Mixed salt cargoes in which up to a fifth or even a third of the consignment was in sacks arrived periodically at Castine and Portland, but they were a distinct minority of the total deliveries.[97] In general, bulk

89. See incoming cargoes of Maine salt ships on the first and second legs of the timber triangle: *Eastern Argus*, *The Morning News*, and *Montreal Gazette*, marine lists, 1850-1859, passim; see also Baker, II, 567.

90. *Eastern Argus*, advertisement, 3 April 1858.

91. *The Morning News*, marine lists, 20 May and 1 July 1850.

92. *Andrews Report*, pp. 521, 564-65.

93. "Coal," *Encyclopaedia Britannica*, 11th ed., VI, 575-76; Hyde, pp. 27, 40; J. Hannay, *History of New Brunswick* (Saint John, N.B.: John A. Bowes, 1909), II, 22.

94. *Eastern Argus* and *The Morning News*, marine lists, 1851-1860, passim.

95. Lane, pp. 145, 380; Head, pp. 107-8; see also *Eastern Argus*, marine list, 23 September 1859.

96. Melville, p. 210.

97. PMM, WP, Miscellaneous Vessels, box 3, file 11: bark *British Empire* and brig *Palmerston*, cargo invoices, Liverpool to Castine, 3, 28

salt consisted of the coarser grades valued for the fisheries and the shipyards because they were slow to turn to brine, while bagging was reserved for the finer grades ground down for table or other domestic uses. The latter made up to a greater extent cargoes destined for metropolitan ports outside Maine. It was not unusual for entire shipments intended for the New York market, for instance, to consist solely of ground salt in sacks.[98]

From the point of view of the importer, bulk shipment, a carryover from the days when salt served simply as ballast, was a mixed blessing. It was the cheapest mode of transport, but it was less desirable in terms of product quality and security. The salt picked up impurities through open contact with the lower timbers of the vessel, and some was lost through seepage and leaks unless sufficient dunnage was employed.[99] Bulk shipment also facilitated cargo loss if the vessel ran aground, since salt was a highly soluble substance and was placed deep in the hold where rupture would invariably take place. It was not unheard of for entire cargoes of bulk salt to be dissolved and washed away in minutes upon the hull being pierced by rocks or shoals. On the other hand, if the grounding was on soft bottom, heavily-laden salt ships could occasionally break free by throwing part of their cargo overboard, a tactic frequently resorted to in emergencies.[100]

There were several ways of measuring salt shipments. Because they usually arrived in bulk, incoming cargoes were most often referred to in terms of their tonnage. That was the case at Castine and most other eastern Maine ports.[101] Portland shipments, however—whether loose or bagged—were reckoned in hogsheads, large casks containing 560 pounds or about eight bushels. Portland wholesale prices were also figured by the hogshead, and large lots of fishing salt were normally purchased by that unit.[102] At Eastport, conversely, deliveries and sales were always computed by the bushel, a probable result of the regional fisheries being dominated by small boats whose owners purchased their supplies in smaller amounts.[103]

The bushel was the most universal measure for salt prior to the Civil War and was often used in lieu of the hogshead, particularly by customs personnel. Its weight was arbitrarily set at fifty-six pounds for tariff-calculating purposes, but in actuality it weighed more. The average was assumed to be seventy pounds, but solar salts were heavier, weighing anywhere from seventy-five to eighty-four pounds per bushel. Liverpool salt was the lightest at about sixty-eight pounds, a contributing factor in its desirability as a fishing and shipbuilding salt.[104]

Upon arrival at the salt ports, cargoes went through a prescribed unloading procedure. The loose salt was first hoisted out using wooden tubs suspended from cargo booms that were affixed to the masts of the vessel. It was then weighed and tallied on the wharf under the supervision of customs officials responsible for determining the import duty. If a delivery was contracted to several firms or individuals, as was often the case at Castine (though not at Portland), the lots were separated out. At this point, barrows or wheeled carts ("cars") were used to transport the cargo to the importer's salt sheds located on or near the wharf.[105]

Often, however, the shipment was purchased on the

March 1849; *Eastern Argus*, marine list, 23 April 1857, and advertisements, 6 May 1859 and 22 May and 28 November 1860; see also *U.S. Foreign Commerce and Navigation Reports*, 1861-1865, annual statements on foreign imports by customs district, deliveries of salt.

98. U.S., Department of the Treasury, *Report of the Special Commissioner of the Revenue, 1868*, 40th Cong., 3rd Sess., 1869, House Exec. Doc. 16, p. 41; *Eastern Argus*, marine list, 18 August 1856; see also Stevenson, p. 392.

99. F. B. Dixon, *The Law of Shipping, and Merchants' and Shipmasters' Guide* (2nd ed.; New York: Henry Spear, 1859), appendix p. 23. Since salt was one of a handful of commodities deemed "perishable in their own nature," marine insurers would not cover salt losses unless they amounted to at least 7 percent, or in some cases 10 percent, of an entire cargo. See Baker Library of Harvard University, The Witherle Collection, case no. 19: Marine insurance policies, various vessels and companies, 1845-1860.

100. *Eastern Argus*, marine lists, 8 November 1849, and 9, 10, 21, 23 March and 22, 23 April 1857; *The Morning News*, marine list, 8 August 1853.

101. PMM, WP, Miscellaneous Vessels, box 3, files 1-3, 11: cargo invoices, various vessels, 1825-1850; see also *Republican Journal*, marine lists, 1 July 1859 and 21 September 1860.

102. *Eastern Argus*, advertisements and wholesale prices current, 1850-1860, passim; Goode, sec. II, p. 210; see also PMM, GC, MS. 125: Journal of Fishing Outfits, William Witherle & Company, 1853.

103. *Eastport Sentinel*, advertisements, 1857-1860, passim; see also O'Leary, p. 131.

104. U.S., Congress, Senate, Committee on Commerce, *Report on Fishing Bounties*, 35th Cong., 1st Sess., 1858, Sen. Rpt. 10 to accompany S. 10, p. 7; Goode, sec. II, p. 210; *Salt Documents*, pp. 64-66, 76-77; Benton, I, 144; PMM, WP, Miscellaneous Vessels, box 3, file 11: brig *Waltron*, memo on customhouse account of salt delivered from Liverpool, April 1851.

105. PMM, WP, Miscellaneous Vessels, box 3, file 11: brig *Waltron* and bark *Rectitude*, memos on customhouse accounts of salt delivered from Liverpool, April and May 1851; C. K. Darrach, *From a Coastal Schooner's Log* (Halifax: Nova Scotia Museum, 1979), pp. 41, 53.

spot by various customers and either carted away by hand truck or loaded immediately aboard adjacent fishing vessels. At both Eastport and Portland, local storekeepers and fishermen had the option of purchasing their salt "afloat" or at the ship, rather than waiting for it to be transferred to the wholesaler's warehouse. Most importers offered discounts to customers willing to relieve them of the trouble and expense entailed in moving their incoming shipments, and those purchasing directly from the ship could usually expect to have trucking and freight costs deducted from their final price.[106]

Some cargoes were spoken for ahead of time, long before the arrival of the salt ships. At Castine, entire incoming shipments were occasionally set aside to be sold piecemeal to specific schooner owners who had contracted for them in anticipation of planned fishing trips. All 750 tons sent from Liverpool aboard the ship *St. Leon* in July 1849, for example, were credited in advance to the accounts of eleven Castine fishing schooners for the upcoming fall fishery.[107] Eastport importers took reserve applications for salt a month or so prior to anticipated deliveries, and advance advertising of expected shipments was routine.[108] Portland importers engaged in the same practice on occasion, but it could prove embarrassing. In 1854, the firm of Hartley, Condon & Company offered the "cargo of [the] ship J. L. Dimmock, now on her passage to this port, for sale—to arrive by June 13." The vessel actually arrived three weeks later on 5 July, after which time the ads were belatedly changed to read "now discharging."[109]

Late deliveries were not uncommon in a commercial enterprise dependent on wind and weather. The North Atlantic was an uncertain environment at best, and delays—to say nothing of disasters—were to be expected. The year 1860 was especially difficult for the salt fleet, and three British members of that season's spring contingent encountered serious problems. The ship *Joseph Howe,* outward bound from Liverpool for Eastport on 23 February, was forced to put back temporarily because of northwest gales and did not reach her destination until 15 May, more than a month after her expected arrival. The ship *Favorite,* which sailed 6 March for Portland, persevered in the face of heavy weather and staggered into port seventy-five days later, minus her fore and main topmasts and the better part of a whole suit of sails. The ship *Queen,* whose advertised arrival date in Eastport was 1 April, put back to Liverpool for repairs in mid-March after developing leaks en route and eventually arrived at Passamaquoddy Bay two months late. If anything, conditions were worse for those vessels making the crossing later in the year. The ship *Ocean Bride* of Newcastle, which made Eastport from Liverpool on 16 November, reported a "fearful passage across," replete with northeast storms and a hurricane.[110] Nevertheless, the salt did get through.

Once safely ensconced in the storage sheds, that portion of Maine's saline cargoes not already sold or reserved drew fishermen to the various salt ports in a set pattern. From the beginning, each port had its distinct marketing region. Three large and five small import and outfitting centers dominated the Maine fisheries scene in the mid-nineteenth century. The big three—Portland, Castine, and Eastport—averaged seven, five, and four salt ships a year, respectively, in the 1850s, while the five secondary ports of Bath, Wiscasset, Camden, Bucksport, and Sullivan averaged one or two (Table VIII).

Between them, the former divided the state's coastline into three rather distinct economic zones. Those fishing villages located down east in Washington County and along the shores of Passamaquoddy Bay on both sides of the international border gravitated toward Eastport.[111] A much larger number in the eastern midcoast region looked to Castine, which fitted out between three hundred and five hundred vessels annually at the height of its trade. Schooners from Penobscot Bay to Frenchman's Bay—roughly the middle third of the Maine coast—depended on Castine for salt, gear, and provisions from 1825 until 1860, and some came there from as far away as fifty miles by sea to obtain their supplies.[112] Business was such that in 1853 the

106. *Eastport Sentinel,* advertisement, 16 May 1860; *Eastern Argus,* advertisements, 26 June 1851, 6, 19 May 1852, 23 July 1853, 13 August 1856, 7 September 1859, 16 April 1868, and 29 July 1870.

107. PMM, WP, Miscellaneous Vessels, box 3, file 3: ship *St. Leon,* cargo invoice, Liverpool to Castine, 12 July 1849.

108. *Eastport Sentinel,* advertisements, 5 May 1858, 20 April 1859, and 14 March and 20 June 1860; ibid., marine lists, 19 May 1858 and 13 June 1860.

109. *Eastern Argus,* advertisements, 3, 7 July 1854, and marine list, 6 July 1854.

110. Ibid., marine lists, 15, 19, 22 March, 2, 7 April, and 19, 21 May 1860; *The Morning News,* marine lists, 7, 19 May 1860; *Eastport Sentinel,* advertisement, 14 March 1860, and marine list, 21 November 1860.

111. *Halifax Comm. Proc.,* p. 2513.

112. *Bangor Daily Whig and Courier,* news item, 18 February 1846; Goode, sec. II, pp. 36, 44, 48, 51; PMM, GC, MS. 125: Journal of Fishing Outfits, William Witherle & Company, 1853.

Table VIII

ANNUAL ARRIVALS OF LIVERPOOL SALT SHIPS AT VARIOUS MAINE PORTS, 1851-1860*

	Portland	*Bath*	*Wiscasset*	*Camden*	*Bucksport*	*Castine*	*Sullivan*	*Eastport*	*Other Ports*[a]	*Statewide*
1851	6	2	1	1	3	8	1	4	1	27
1852	7	4	1	1	2	7	1	2	2	27
1853	5	4	1	1	4	5	1			21
1854	10	3		1	3	5	2	4	1	29
1855	7	1			4	5	2	3		22
1856	9	1		2	2	5	2	5	2	28
1857	8	2	1	1	2	3				17
1858	3	1	1	1	1	4	1	4		16
1859	3	2	1	3	1	2		5		17
1860	7	3		3		3		8	1	25
TOTAL	65 (28%)	23 (10%)	6 (3%)	14 (6%)	22 (10%)	47 (21%)	10 (4%)	35 (15%)	7 (3%)	229 (100%)
Yearly Average	7	2	1	1	2	5	1	4	1	23

*Sources: See Table II.

a. Belfast, Bangor, North Yarmouth, Rockland, "Penobscot Bay."

town's leading salt firm, Witherle & Company, sought and obtained state permission to extend its wharves more than one hundred feet into the tidal waters of Castine harbor, giving it eighteen thousand square feet of dockage to berth and service salt ships and outfitting fishermen.[113]

Portland's trade, encompassing the entire western third or more of the Maine coastline, was even greater. Until circa 1825, when Castine entered the picture, Portland held a virtual salt monopoly statewide and fitted out most of the fishing vessels in eastern and central Maine as well as its own region. After that date, the city continued to control most of the outfitting trade west of Rockland, serving fishermen in outports as far removed as Georgetown and Matinicus.[114] Quantitatively, Portland-Falmouth District dominated Maine's salt import trade, leading all other districts for the years in which statistics are available. From 1838 to 1861, its share of Maine's saline imports gradually climbed from one-third to one-half, and in 1857, when antebellum shipments reached their peak, nearly two-thirds of all incoming salt was landed at Portland.[115]

After the three primary entrepôts of Portland, Castine, and Eastport had skimmed off the cream of the import and outfitting trade, the remaining secondary salt ports, most notably Bath and Bucksport, absorbed the residue. By concentrating on the specialized needs of local fishing fleets, shipbuilders, and shore fishermen unwilling to undertake the long sea trek to one of the major regional supply centers, they managed to attract about a third of Maine's incoming salt ships in the 1850s (Table VIII). Still, they never seriously threatened the commercial hegemony of the big three, whose merchants maintained their dominant spheres of influence until nearly the end of the salt trade era.

The Maine transatlantic salt trade flourished until the early 1860s, when four developments, one external and three internal, conspired to undermine it. The first was the decline of the British-Canadian timber trade in the late 1850s and especially after 1860, as a result of reduced tariff preferences for Canadian wood, intensified competition from Baltic timber producers, the diverting presence of the American market, and the exhaustion of eastern Canada's pine forest.[116] This decline

113. Maine, *Private and Special Laws, 1853*, chapter 70.

114. Goode, sec. II, p. 36; C. Long, *Matinicus Isle: Its Story and its People* (Lewiston, Maine: Lewiston Journal, 1926), p. 54; *Eastern Argus*, marine list, 26 May 1854.

115. *Salt Documents*, pp. 168-69; *U.S. Foreign Commerce and Navigation Reports*, 1856-1861, annual statements on foreign imports by customs district.

116. Lower, pp. 122-24.

manifested itself in a gradual breakdown of the northern triangle, a trend evidenced by the reduced number of British carriers in the Maine salt fleet after 1857 (Table I).

Just as the transatlantic timber trade began to level off, the international trade in cotton was shattered by the American Civil War. The Union naval blockade of Confederate ports effectively removed two legs of the southern triangle, while the New England and other northern shipping essential for its operation was eliminated through wartime seizures or forced overseas sales.[117] The loss of the two triangular trades upon which the Maine salt trade was largely premised meant a severe reduction in the number of ships available for transatlantic salt carriage beginning in the 1860s.

Almost simultaneously, two other factors came into play. The most important was the post-1860 decline of the Maine deep-sea fishing industry, the primary user of imported salt. Although a multifaceted process that took several decades, the disintegration of Maine's fisheries owed its initial impetus to the depredations of the Civil War and the war's immediate aftermath. These included the disruption of established marketing patterns, the removal of government subsidies, higher marine insurance rates, and rampant wartime inflation which drastically increased prices on fishing necessities.[118]

This last item was the most critical, and it was directly related to the third domestic development of special significance to the saline trade, the wartime increase in the tariff on imported salt. Until the Civil War, import duties on foreign salt were relatively benign. These favorable low rates, which reached trifling levels during the fifteen years preceding the war under the "free trade" tariffs of 1846 and 1857, provided a major stimulus to imports. The onset of hostilities and the concurrent revival of protectionism in the North changed all that. The Morrill Act of 1861 and its upward revision in 1862 increased the duty on foreign salt by eightfold in less than two years. This higher impost effectively cancelled out the factor of overland transportation costs, which had previously kept domestic salt from the interior out of coastal markets. Worse still for importers, the coming of peace brought little relief, since the 1862 rate schedule remained essentially in place for a decade. There was a limited concession made to users of fishing salt in 1866, when duty-free status was conferred upon supplies actually carried aboard vessels as partial compensation for the removal of federal fishing subsidies. However, that reduction applied to only about half of the salt used in the industry and had no impact at all on shipbuilders and other consumers. The eventual removal of the residual duty on curing salt in 1872 was a classic case of too little, too late as far as fishermen and salt merchants were concerned. By then, irreversible damage had already been done to the Maine sea fisheries and, by extension, the state's saline import trade.[119]

Arrivals from England at Maine ports reflected the diminished state of the salt trade in the 1860s. Incoming vessels entering at customs districts from Penobscot Bay eastward shrank in number from sixteen in 1861 to two in 1864. Frenchman's Bay District (i.e., Sullivan) received its last delivery of Liverpool salt in 1862, Passamaquoddy and Belfast districts (Eastport and Camden) in 1863, and Penobscot District (Castine and Bucksport) in 1864. After an interval of about a decade, a few scattered salt shipments from England and Spain were delivered to eastern ports in the 1870s, but nothing sufficient to reestablish a regular trade. Moreover, almost none of these latter cargoes were brought in foreign bottoms, an indication of the total disappearance of British timber ships from salt ports east of Rockland.[120]

What remained of the Maine transatlantic salt trade after 1865 was focused chiefly on Portland, the center of the state's reduced and consolidated postwar fishing industry, and on Bath, the state's primary shipbuilding locale. Of the two, Portland's trade was the more significant. It was dominated by Dana & Company (formerly L. & W. S. Dana), the city's leading salt import firm for most of the nineteenth century, and by Enoch G. Willard, agent for J. P. & G. C. Robinson of New York.[121]

Until 1880, Portland's postwar salt supply continued to be imported directly from abroad,[122] the Liverpool

117. J. G. B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914: An Economic History* (Cambridge: Harvard University Press, 1941), p. 321; Johnson, et al., II, 57-59.

118. O'Leary, pp. 210-46, passim.

119. Ibid., pp. 222-29, 232-33.

120. *U.S. Foreign Commerce and Navigation Reports*, 1860-1890, annual statements on entrances and clearances by customs district.

121. Goode, sec. II, p. 90.

122. An exception was the small but growing influx of domestically produced Syracuse salt, now able to compete in price with imports, which

portion of it coming almost exclusively in British ships—the remnants of the northern timber fleet. With the breakdown of the triangular trade, however, Liverpool shipments had declined markedly in number and as a percentage of the total, and the city's salt import trade had taken on a decidedly cosmopolitan flavor. Dana & Company, for example, was obtaining supplies from Spain, the Canadian Maritimes, and the Dutch, French, and British West Indies in 1870, as well as from England. Sources theretofore largely untapped, such as the Bahamas and the Lesser Antilles, had now become significant, and varieties of salt available in the Portland market included such disparate brands as Turk's Island, Bonaire, Anguilla, Inagua, and St. Martin's.[123]

Toward the end of the 1870s, the search for supplies led to a brief revival of trade with the European solar salteries. Imports from Cadiz took on renewed importance, and in the early 1880s shipments arrived from the Mediterranean ports of Cartagena, Hyères, and Trapani.[124] The revival did not last, however. It really represented an Indian summer for the transatlantic trade, which was over for all practical purposes by the middle of the decade. Liverpool arrivals at Portland, which had averaged seven ships per year in the 1850s (Table VIII), fell to five in 1870, to three in 1880, and to none at all in 1885. Transatlantic shipments from all sources had totalled ten vessels in 1880. Five years later they dropped to just four.[125]

The final collapse of the transatlantic salt trade was part of a general decline in all foreign salt imports. To meet the demands of the burgeoning local fisheries, which blossomed briefly in the 1880s under the aegis of the pickled mackerel business, Portland merchants turned not to their historic overseas suppliers but to supply houses in Boston and New York. Schooners from those two cities began to replace square-rigged ships from Europe and the West Indies as the chief source of Portland's salt shortly after 1880.[126] Local salt merchants consequently played a steadily diminishing role as independent importers, serving instead as regional conduits for the coastal trade. They also lost much of their wholesale business, as waterfront fish dealers and packers increasingly bypassed them in order to deal directly with Boston or New York importers.[127] This growing dependence on outside sources of supply was symptomatic of the structural economic weaknesses that eventually undermined Portland's position as a leading fishing port. Of more immediate concern to this discussion, it marked the end for Maine's salt import trade.

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came from New York by coastwise schooner. See *Eastern Argus*, marine lists, 14, 21 April 1868, and advertisements, 16, 24 April 1868.

123. *Eastern Argus*, advertisement, 29 July 1870.

124. Ibid., marine lists, 1880-1885, passim.

125. Ibid., 1870, 1880, 1885, passim.

126. In 1870, 90 percent of Portland's salt cargoes came directly from foreign sources. By 1880, that share was down to less than 70 percent, by 1883 to under 30 percent, and by 1885 to barely 20 percent. See *Eastern Argus*, marine lists, 1870, 1880, 1883, 1885, passim; see also O'Leary, pp. 277-80.

127. For example, the fishing firms of G. Trefethen & Company, Carney & Prince, A. M. Smith, C. A. Dyer and A. G. Sterling. See *Eastern Argus*, marine lists, 29 June 1880, 24 April, 16 May, 24 June, 6 August, and 19 September 1883, and 11 August and 5 September 1885; see also *The Mining and Industrial Journal*, 26 December 1884, p. 8.

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U.S. Navy Gun Carriages from the Revolution through the Civil War

SPENCER C. TUCKER

MUZZLE-LOADING guns, which were the chief armament on U.S. Navy ships for approximately one hundred years, were mounted on sturdy wooden carriages. Although some large guns (and even short pieces, known as carronades) were carried on pivot mounts amidships or at bow and stern, most long guns were in broadsides, supported by their trunnions (lugs cast on the side of the gun) on the common truck carriage, so named for its four wooden wheels known as trucks.

It was an amazingly efficient design which saw but little modification over its long period of utilization. One writer noted, in commenting on Civil War naval ordnance in 1862, that the common sea service truck carriage had "continued in its present form and proportions, without material alteration, for nearly three hundred years."[1] This statement is, in fact, not wide of the mark.

Ship carriages were quite similar in design to garrison carriages on land, but garrison carriages were usually of iron and ship carriages were of wood. Wood was preferred for sea service as it was not as liable to break and splinter and was also lighter than iron. The difference in weight was considerable. In 1852 a carriage for a long 24-pounder weighed 860 pounds in wood; the same carriage in iron weighed 2,268 pounds.[2]

The earliest extant U.S. Navy contract for gun carriages is one of 1808. The contract called for the wooden parts of the two hundred carriages (forty each for 9-, 12-, 18-, 24-, and 32-pounder guns) to be of elm, except for the axletrees which were to be of white oak.[3]

1. Edward Simpson, *A Treatise on Ordnance and Naval Gunnery, compiled and arranged as a textbook for the U.S. Naval Academy* (2nd ed., revised and enlarged; New York: D. Van Nostrand, 1862), p. 127.

2. Maj. Hector Straith, *Treatise on Fortification and Artillery* (2 vols.; 6th ed.; London: W. H. Allen, 1852), II, 149.

3. U.S., National Archives, Record Group 45, Entry 235.

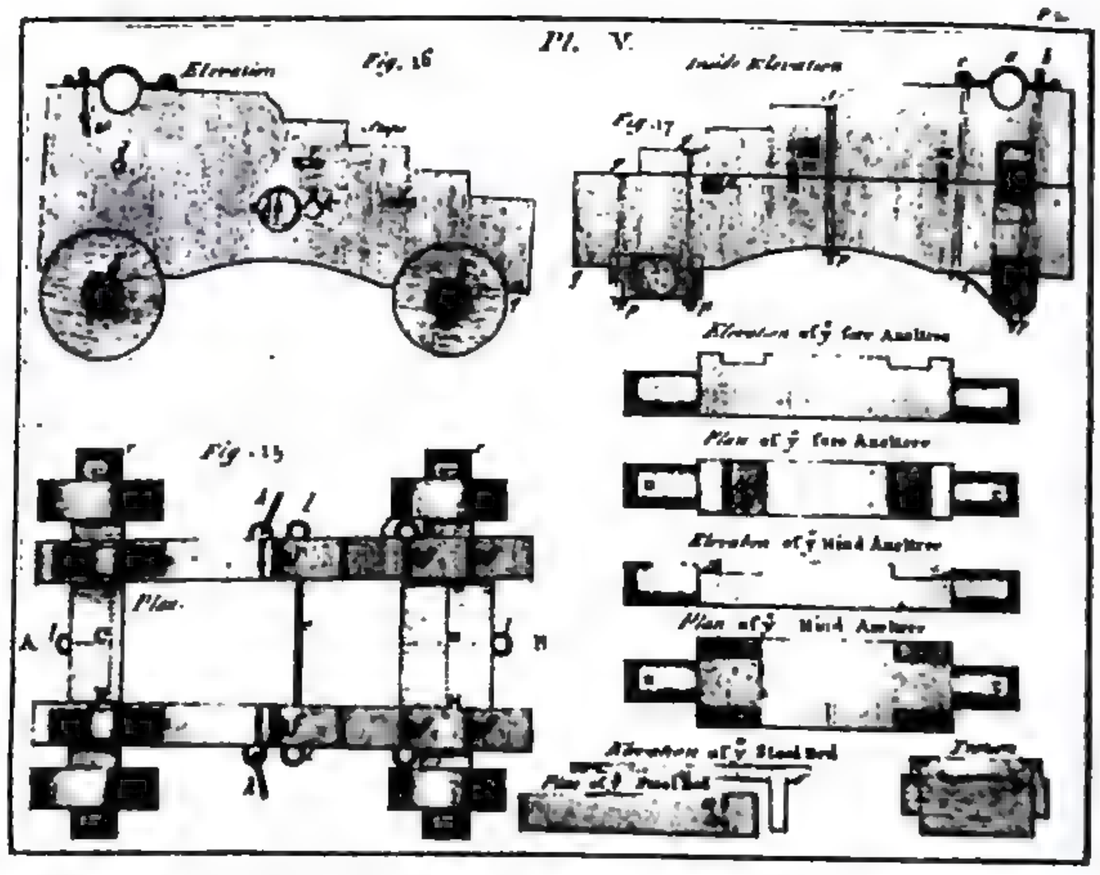


FIG. 1. ENGLISH SHIP CARRIAGE, JOHN MULLER, 1757

On the line AB, two points—C and D—were to be the distance from the center of the trunnions to the extremity of the breech of the gun (that is, three-fourths the length of the gun). From C and D two lines were drawn at right angles to line AB. EF (which passed through C) was to equal the diameter of the second reinforce ring of the gun; GH (passing through D) was equal to the diameter of the base ring. Lines drawn through E and G, and F and H, determined the inside width of the carriage.

An 1820 contract specified that all the gun carriage "stuff must be of the first quality White Oak, free from Sap, heart & defects of every kind. . . ."[4]

Until the mid-nineteenth century, American naval ordnance design closely followed that of Britain. This was also true of the carriages, and a principal source for this was English artillerist John Muller. In 1757 Muller published *A Treatise of Artillery*, in which he detailed the formulas for determining the size of ship carriages

4. Ibid.

then in use in the Royal Navy. Muller was a professor of fortification and artillery at Woolwich, known for his advocacy of lighter guns and the use of cast iron rather than bronze in their fabrication. While the so-called Muller system was never officially adopted in the Royal Navy, his book with its illustrations and calculations for determining the dimensions of carriages was certainly known in the American colonies at the time of the Revolutionary War. A copy of his book was even published at Philadelphia in 1779.

Muller's carriage drawing (see fig. 1) can be compared with that of John Robertson, another Englishman, published in 1775 (see fig. 2), and also with the earliest extant American naval carriages, those of the Continental Navy gondola *Philadelphia*. The gondola was part of Gen. Benedict Arnold's little fleet of fifteen vessels on Lake Champlain, constructed in 1776. *Philadelphia* was sunk in the Battle of Valcour Island in October of that year; today she resides in the Smithsonian Institution's Museum of American History. The chief differences in the carriages of Muller, Robertson, and that for a 9-pounder recovered with *Philadelphia,* are in the size of the trucks and brackets, and the placement of the axletrees.

Muller identified the wooden parts of the truck carriage as the axletrees, arms of the axletrees, fore and hind trucks, brackets, transom, stool bed, and quoin. The iron pieces included the bed bolt, transom bolt, cap squares, joint bolts, breeching bolts, and loops.

All the carriage dimensions were proportioned to the individual gun for which it was intended. For example (see fig. 1), the side pieces of the carriage, known as the brackets, were one caliber (the diameter of the bore) of the gun in thickness. The length from D to B was the

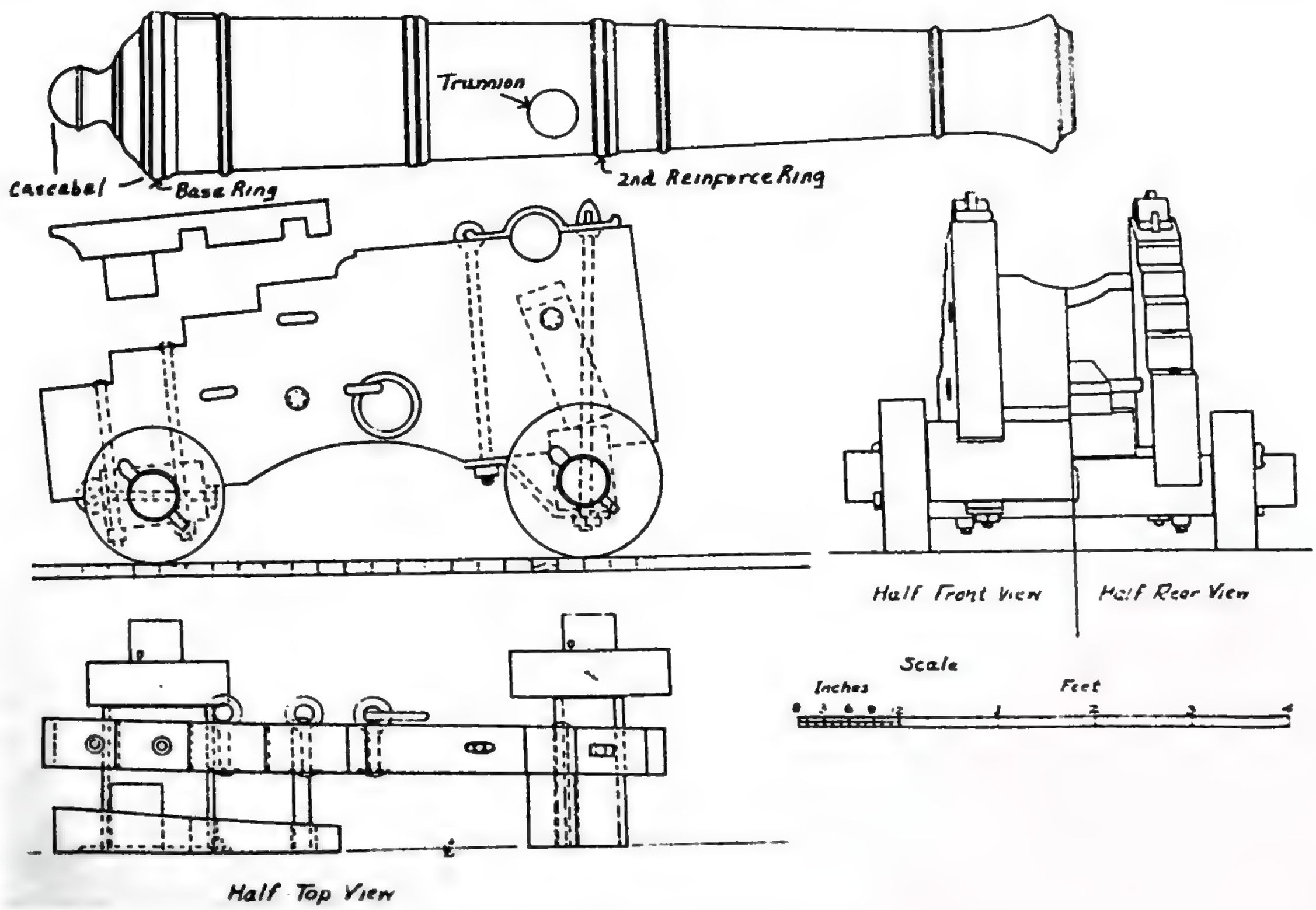


FIG. 2. English 24-pounder and carriage circa 1775, after the John Robertson.

length of the cascabel of the gun. From C to A the distance was half the diameter of the trunnions and half the diameter of the fore trucks (later it was expressed simply as two calibers).

The trunnion holes were one caliber, with the center being located at C, a quarter of an inch below the top surface of the side pieces. On each side of line GH, six inches were allowed for the breadth of the axletree, which was always twelve inches. The fore part of the trunnion hole was the center line for the fore axletree.

The height of the side pieces in front was 4¾ diameters of the shot and half that height behind. The steps, or offsets in the brackets, were each one-eighth the length of the side pieces, or taken together one-half of the side piece beginning in the rear. The quarter-round, which finished off the steps, was taken from the fore part of the carriage. The steps in the carriage provided a fulcrum for handspikes used in elevating or depressing the gun.

The lower part of the brackets was hollowed out in the form of an arch so as to make them somewhat lighter without, however, reducing their strength. The axletrees were sunk into the side pieces and a strong transverse connecting piece of timber known as the transom, which was a shot diameter in breadth and two high, was placed so that the fore part was in a line passing through the center of the trunnion holes and so protected by one inch; the lower edge touched the axletree (Muller advocated placing the transom so that it was directly over the fore axletree and exactly in the middle of the height of the side pieces).[5]

The trucks were equal in breadth to that of the side pieces. Usually the fore trucks were larger than the hind ones by half a diameter (Muller gave dimensions of 4 bore diameters of the gun for the size of the fore and 3½ for the hind; others give 3 and 2½ as the diameters; but, as Muller himself noted, ". . . we have observed before, that if the port-holes in ships are made higher or lower, these dimensions must be increased or diminished."[6]

The metal capsquares over the trunnions were hinged to permit easy removal of the gun. The other end of the bolt holding the capsquare in place secured the fore axletree against the bracket by means of washers and iron pins. A transom bolt and bed bolt (the latter supporting the stool bed) were riveted over burrs.

5. John Muller, *A Treatise of Artillery* (London: Printed for John Millan, Whitehall, 1780), pp. 97-98.

6. Ibid., p. 98.

There were also two ring bolts for breeching and six metal loops for tackles. The one in the breast transom was used for transporting the carriage about the deck. The one at the rear was for the train tackle.[7]

The carriage had to recoil; otherwise it would be destroyed. Its weight was thus a matter of some concern. If too heavy, the carriage would be damaged by the recoil; if it was too light, it would have an inconvenient—perhaps even dangerous—movement aboard ship where the limited space rendered it necessary to hold recoil within set limits.

When the gun was fired, the trucks initially slid without turning, the friction helping to diminish the recoil. (Recoil could also be eased by decreasing the diameter of the trucks.) It was only after part of the recoil when the weight was equalized that the trucks began rotating.[8]

The position of the trunnions on the gun also had an impact on recoil. English guns had less recoil because they were quarter-hung (trunnions slightly below the axis of the bore), thus producing a downward pressure on the breech. Placing the trunnions lower also allowed unobscured vision to the side of the gun, and was thought to provide a better bond for the trunnion to the gun. It had the negative effect of greater strain on the carriage. Muller had argued for trunnions to be located on the axis of the gun. This position won acceptance in the U.S. Navy where all guns came to be center hung with the axis of the trunnions precisely at right angles to that of the bore.

Recoil of the gun on its carriage was restrained by stout rope known as breeching. It was of length sufficient to allow the muzzle of the gun to come back to loading position within the port of the ship (one foot inside the upper port sill, if the breadth of the vessel would allow.)[9] In 1821 breeching for U.S. Navy ship guns was in circumference one-and-one-quarter times the diameter of the bore and made of three-stranded hemp. In length it was three times that of the gun except in the case of lower deck guns where there was more room and it was three-and-one-third or three-and-one-half.[10] By 1860 breechings were not less than 7½ nor

7. See following pages for more on breeching and tackle.

8. Simpson, *A Treatise on Ordnance and Naval Gunnery*, p. 120.

9. U.S., Bureau of Ordnance, Navy Department, *Ordnance Instructions for the United States Navy* (2nd ed.; Washington: G. W. Bowman, 1860), p. 150.

10. U.S., National Archives, RG 45, BG Subject File.

more than 8 inches in circumference, except for the IX-inch guns where it was to be 9 inches. Breeching was not to be covered nor blackened.[11]

The breeching was secured to the cascabel neck, and later rove through the cascabel ring or snatched in the horizontal slot, known as the shark's mouth, on the breech of newer pattern guns. The slot or shark's mouth was closed by means of a chock secured by a pin. The breeching was rove through the breeching ring (later the shackle) on the carriage and had its ends secured to the bulwarks on either side of the gun port. (In French practice, the breeching was secured not to the gun but to its carriage. It passed through a hole in one bracket, underneath the gun, and then out through a similar hole in the other bracket. This was, in fact, the chief difference between the French, and English and American naval gun carriages.)[12] By 1850 the breechings for the guns had thimbles to shackle them to the starts in the bulwarks. By that time even old-style guns with breeching rings had the ring cut out to allow the breeching to be snatched. This greatly facilitated replacing the breeching when it became necessary.[13]

Breechings, at least those on the gun deck, were soon damaged by continued exposure to moisture, and for that reason spares, already sized, were kept on hand.[14]

One difficulty with the breechings was that when the gun was fired obliquely (off the beam) the strain on them was unequal. That problem was addressed in a carriage invented by Colonel Rome of France. With only two trucks, it resembled the stock trail field carriage. It had a compound breeching of chain and rope connected to a single breeching bolt below the center of the gun port sill. The Rome carriage required two fewer men to work it, and provided for equal straining on the breeching, even in oblique fire. But, in spite of these advantages, the Rome carriage was never standard in the U.S. Navy. This was in part because of the vulnerability of its chain to enemy fire, and the possibility that its pieces, "flying in every direction, would become so many instruments of destruction."[15]

Even with breeching, the recoil of the truck carriage was not always uniform or predictable, especially in oblique fire. Writing in 1811, the English artillerist William Congreve noted, "It is a lamentable truth, that numbers of men are constantly maimed, in one way or another, by the recoiling of heavy ordnance on board ships of war." Much of this was the result of the random recoil of the carriage which moved with its gun in an uncertain path and was "much affected not only by the motion of the vessel but also by the inequalities of the deck; inasmuch that it is difficult for the people to know, within several feet, the point to which the carriage will come." Even with careful attention to the tackles, it required "the greatest watchfulness on all hands to prevent accidents."[16] This, of course, was with breeching. The consequences could be much worse if the gun broke free altogether during recoil. It could even sink the vessel.

Once the gun was loaded and ready to fire, the carriage was returned to battery by means of the side tackles. Lateral movement during "running out" was checked by the train tackle (also known as the in- or preventer-tackle) which was also utilized to bring the gun in if necessary and hold it in position during loading. According to U.S. Navy specifications of 1821, tackles were one-half the diameter of the bore in circumference and were made of three-stranded hemp. Side tackles were six times the length of the bore for lower deck guns and five-and-a-half for others.[17] By 1860 tackle was to "be made of Manilla, or such other pliable rope" as directed by the Bureau of Ordnance. They could not be blackened and were 2¼ to 2½ inches in size for the smaller guns and 3 inches for the larger.[18]

In 1821 blocks for gun tackles were 1 5/16 the diameter of the bore in length for 18- to 42-pounders and 1⅔

11. U.S., Bureau of Ordnance, Navy Department, *Ordnance Instructions for the United States Navy*, p. 150. Lieutenant John Dahlgren noted in 1848 in his test firing of the 32-pounder gun of 32 cwt that its breeching was of the "usual kind" and 7.75 inches in diameter. U.S., National Archives, RG 74, Records of the Bureau of Ordnance, Section I, "Report on firing of 32 pounder gun," p. 22. It is believed that what is referred to here and in some other contemporary figures is really circumference. Edwin Rich reached the same conclusion in an article, "The Sizes of Gun Tackles and Breechings," *Nautical Research Journal* (XII, no. 1), 14-17.

12. For superb illustrations of French Navy gun carriages see Jean Boudriot, *Le Vaisseau de 74 Canons*, vol. II: *Construction du Vaisseau* (Grenoble: Editions des Quatre Seigneurs, 1974).

13. William N. Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery* (New York: D. Appleton & Co., 1850), p. 205.

14. Gen. Sir Howard Douglas, *A Treatise on Naval Gunnery* (3rd ed., revised; London: John Murray, 1851), p. 410.

15. Simpson, *A Treatise on Ordnance and Naval Gunnery*, pp. 120, 132-33.

16. Sir William Congreve, *An Elementary Treatise on the Mounting of Naval Ordnance . . .* (London: J. Eagerton, 1811), p. 15.

17. U.S., National Archives, RG 45, BG Subject File.

18. U.S., Bureau of Ordnance, Navy Department, *Ordnance Instructions for the United States Navy*, p. 150.

the diameter of the bore for the lower caliber guns to 12-pounders.[19] The 1860 Ordnance Instructions specified that gun tackle blocks were to have "pins of hardened copper, turned smooth, and sheaves of lignumvitae without bouching." Those for 3-inch falls were to be 10 inches long; those for 2½-inch falls, 9 inches; and those for 2¼-inch falls were to be 8 inches long. Metal blocks with nibs, designed by Commander John Dahlgren in the 1850s, "which keep the blocks fair with the falls, and thus prevent the falls from fouling in the recoil," were found to be an improvement on the old wooden blocks in use up to 1860. Hooks of the gun-tackle blocks were not to be less than 1½ inches in diameter at the bend for heavy, and 1¼ inches for light broadside guns.[20]

Over the years there were slight modifications to the truck carriage in the U.S. Navy. An extension to the breastplate, adopted from the French Navy (and apparently not much used on contemporary English ship carriages),[21] had appeared in the period 1780-1800. Initially it was solid, later a hinged shelf. When the hinged part was up, the carriage could be run out so that the fore trucks rested against the waterways, with the breasts of the brackets against the spirketting. Thus the weight of the gun and carriage did not concentrate on any one part of the ship's side; this was especially important in bad weather with the gun secured. When the outer part of the breast piece was down, the fore trucks were brought back clear of the waterways and the arc of the breastplate allowed lateral train of the gun for oblique fire.[22] Also, by 1850 dumb trucks were added to the carriage and chocking quoins had been furnished to all batteries. Two of the chocking quoins were placed before the fore trucks in order to prevent the return of the gun to the side after firing. This dispensed with having to secure the train tackle or place crowbars under the trucks.[23] Chocking quoins were also used when the gun was housed in.[24]

Another change was in the quoin. It was the wooden wedge used to elevate the gun. The quoin was marked on its side in degrees of elevation and depression. Later, in the U.S. Navy during the Civil War, degrees of depression were marked on the flat part and for depressing the gun the quoin was turned on its side.[25] The greatest depression occurred when the quoin was run home.

As a result of the violent movement of the carriage when the gun went off, the quoin frequently flew out, endangering the gun crew. This was rectified in an invention of Adm. David Porter consisting of an iron projection on the bottom of the quoin which caught in a ratchet secured in the bed (see fig. 3). Later, other modifications were made. The most effective of these was the screw-quoin of Lieutenant (later Commander) J. H. Ward. Apparently this horizontal screw quoin was first developed in the French Navy. In the U.S. Navy it appeared in several forms; but although it performed well in tests,[26] the screw quoin had not been adopted for the navy by the Civil War.

While not precise in determining elevation, the old wooden quoin had the advantage of being rapid to operate and allowed the greatest extremes of elevation.[27]

A metal vertical elevating screw, in use with field carriages, was employed first at sea with the carronade. The French used it for their long-gun carriages and the U.S. Navy also experimented with it, screws being developed by both Dahlgren and Hart.[28]

The vertical elevating screw was easily bent or damaged, and slow to operate. The latter was not a great disadvantage, however, as significant changes in elevation were seldom necessary at sea.[29]

Since wood deteriorated under constant exposure to

19. U.S., National Archives, RG 45, BG Subject File.

20. U.S., Bureau of Ordnance, Navy Department, *Ordnance Instructions for the United States Navy*, p. 151.

21. J. D. Moody, "Old Naval Gun-Carriages," *The Mariner's Mirror*, XXXVIII, no. 4 (November 1952), 306.

22. Simpson, *A Treatise on Naval Gunnery*, pp. 125-26.

23. Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery*, p. 204.

24. U.S., Bureau of Ordnance, Navy Department, *Ordnance Instructions for the United States Navy*, p. 35.

25. John D. Brandt, *Gunnery catechism as applied to the service of naval ordnance adapted to the latest official regulations, and approved by the Bureau of Ordnance, Navy Department* (New York: D. Van Nostrand, 1864), pp. 76-77.

26. Dahlgren used the Ward-designed screw quoin in his ranging tests in 1848 on the 32-pounder of 32 cwt. Dahlgren said it was "well adapted to give the closest adjustment in elevation & strong enough to endure the whole of this Practice." U.S., National Archives, RG 74, Records of the Bureau of Ordnance, Sec. I, "Report on firing of 32 pounder gun," p. 22. A drawing of it was included in his report of the 8-inch gun in 1849. Ibid., Sec. II, "Report of 8-inch gun."

27. Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery*, p. 52.

28. Simpson, *A Treatise on Ordnance and Naval Gunnery*, p. 143.

29. Commander James H. Ward, *Elementary Instruction in Naval Ordnance and Gunnery* (Revised edition; New York: D. Van Nostrand, 1861), p. 169; and Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery*, p. 52.

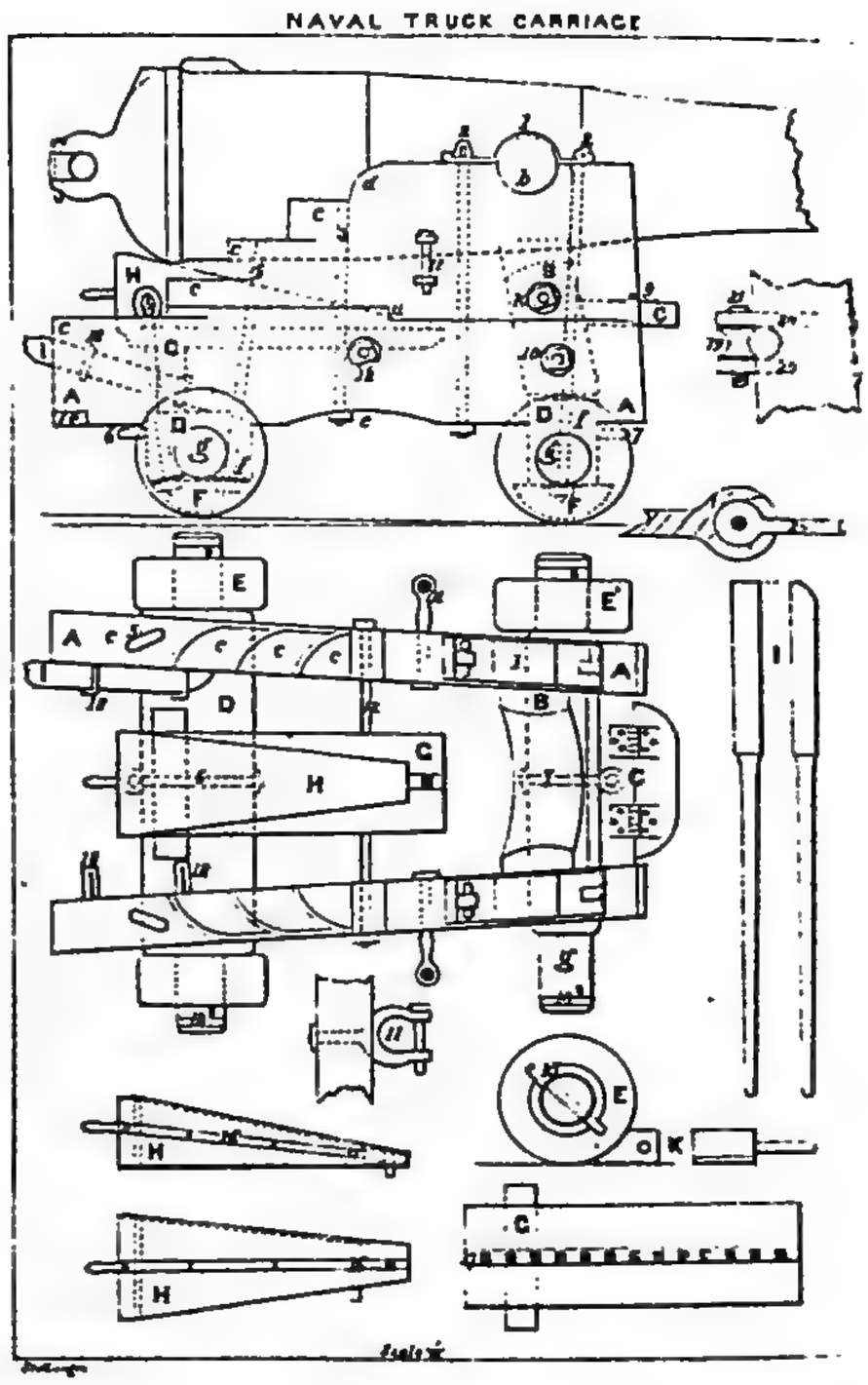


FIG. 3. Ordnance Instructions, 1852

the elements, particularly in the high humidity of the tropics, there were efforts in the first half of the nineteenth century to replace the wooden carriage with those of cast and wrought iron. The wrought iron carriages were more successful than those of cast iron, but neither proved satisfactory. They often broke under the shock of the discharge of the gun, rendering them unsafe with charges greater than one-fourth the weight of the shot.[30] And if struck by shot, they were prone to shatter into pieces, producing the same anti-personnel effect as grape shot. Iron carriages were also difficult to repair.

Wooden carriages were painted to protect them from the elements. A dull red color was often favored since it prevented blood—which might be spattered about in an engagement—from being too obvious. This color was extended to other ship fittings for the same reason. Red or chocolate seem to have been the colors favored in the Royal Navy during the period of the wars of the French Revolution and Napoleon.[31] By order of 1807, in the Royal Navy all gun carriages were to be painted red, white, chocolate, or yellow.[32] By 1860 in the U.S. Navy it was usual practice to paint the carriages black. This was done by scraping the old paint off, filling the cracks and holes with black putty, applying three or four coats of stain, and then one coat of boiled oil. Rubbing the carriage occasionally would keep it black.[33]

In other maintenance, linch-pins, shackle-bolts, and other parts were to be removed twice a week, cleaned

30. Simpson, *A Treatise on Ordnance and Naval Gunnery*, p. 122. By the 1850s the maximum powder charge was one-third the weight of the shot.

31. Edward Kebier Chatterton, *Ships & Ways of Other Days* (Philadelphia: J. B. Lippincott, 1913), pp. 247-48, 280.

32. Robert Simmons, *The Sea-Gunner's Vade-mecum; Being a New Introduction to Practical Gunnery* . . . (London: Steel and Co., 1812), p. 71.

33. Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery*, pp. 204-5.

and rubbed with black lead inside.[34] All the iron works of the carriages, as well as the guns themselves, were to be kept free of rust. Tallow was used to protect elevating screws, pivot bolts, etc. Capsquares were to be removed frequently, the guns lifted out and their trunnions cleaned.[35]

It was hard to improve on the standard truck carriage. It combined strength, stability, simplicity, and ease of transportability on board ship. It also had the capability of being brought back into battery again, in case of a break in the breeching, more easily than any other carriage.

The principal defects of the wooden truck carriage were its cumbersome nature, weight, expense of construction, violent and unequal recoil on its breeching, and difficulty in training.[36]

The wooden carriage was indeed heavy. In 1861 the carriage for a heavy 32-pounder weighed 1,200 pounds, while the lightest truck carriage for a 32-pounder was 1,000 pounds.[37]

By the mid-nineteenth century, there were a number of attempts to improve on the common truck carriage. One was by Commander James Ward. In the Ward carriage the dumb trucks were removed and a fore and aft piece placed between the axletrees. A fixed roller handspike (with rollers nine inches in diameter) was added immediately beneath the trunnions. The carriage was then placed on a slide high enough to lift the trucks clear of the deck. The ends of the breeching were spliced together and shackled to a bolt beneath the center of the sill.

The advantages of the new carriage included ease of running out and recoil, transportability, and equal strain on both legs of the breeching. The gun was always in the center of the port and the tackles did not have to be dropped before firing.

The disadvantages of the Ward carriage included the necessity of more room for its operation, the damage done to the vessel by its slide, which was also heavy and expensive, and the fact that the vertical screw could not be used with it.[38]

The advantages seemed to outweigh the defects, and by 1862 further refinements had been made. The slide was strengthened, while at the same time its weight was reduced.

In trials on board receiving ship *North Carolina* at New York the Ward carriage was compared to the conventional truck carriage. Both mounted a 32-pounder of 61 cwt. (Cwt, used to designate the weight of guns into the Civil War period, stands for "hundred weight." One cwt equals 112 pounds. Thus a gun of 61 cwt weighed approximately 6,832 pounds.) The Ward carriage was judged superior in ease of training. Still, by 1862 it had not been adopted although Dahlgren at the Ordnance Bureau ordered it given a trial.[39]

Prior to the Civil War various carriages were developed to cut down on recoil by means of friction. These consisted of a top carriage mounted on a slide. The friction of the carriage on the slide was increased by means of a clamp and compressor.

One of these was known as the Pook Friction Carriage. It was tried out in smaller vessels carrying light 32-pounders of 27 and 33 cwt. By 1852 it was still judged as "merely experimental to ascertain its relative merits as compared with other carriages."[40]

Objections to this system were that the crew might forget in action to compress the carriage on its slide and thereby endanger themselves and the carriage when the gun was fired. It was also judged very vulnerable; a shot hitting any part of the carriage might disable it.[41]

In competition with the Pook Friction Carriage for the light 32-pounder guns on the smaller ships was a carriage designed by Hardy. By 1852 it had been adopted for the light guns of third class sloops.[42] The initial carriage was judged too heavy, inconvenient to work, complex, taking up too much room, hard to transport aboard ship, and deficient to the common truck carriage in every area except recoil.[43] In 1862 one

34. Ibid., p. 305.

35. U.S., Bureau of Ordnance, Navy Department, *Ordnance Instructions for the United States Navy*, p. 8.

36. Simpson, *A Treatise on Naval Gunnery*, pp. 127-28.

37. Ward, *Elementary Instruction in Naval Ordnance and Gunnery*, p. 129.

38. Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery*, pp. 48-49; and Simpson, *A Treatise on Naval Gunnery*, pp. 128-29.

39. Simpson, *A Treatise on Naval Gunnery*, p. 130.

40. U.S., Bureau of Ordnance, Navy Department, *Instructions in Relation to Preparation of Vessels of War for Battle* (Washington: C. Alexander, 1852), p. 137.

41. Simpson, *A Treatise on Naval Gunnery*, p. 119.

42. U.S., Bureau of Ordnance, Navy Department, *Instructions in Relation to Preparation of Vessels of War for Battle*, p. 134.

43. Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery*, p. 51.

writer noted that the original carriage had met with "but indifferent success."[44]

By 1852 the Hardy carriage had been fitted with a compressor designed by Captain Van Brunt. The carriage itself was also, at some point, redesigned and improved—so much so, in fact, that it was referred to by 1860 simply as the Van Brunt carriage. The improvements rendered it effective with broadside guns, particularly light ones.

In the Van Brunt carriage transoms were substituted for the axletrees of the common truck carriage. The carriage rested on a slide, but four trucks secured to the brackets by bronze boxes and axles, rested on the deck at the sides of the slide and supported the weight of the carriage and kept the transoms of the carriage up from the slide. This enabled easier movement of the carriage in running out.

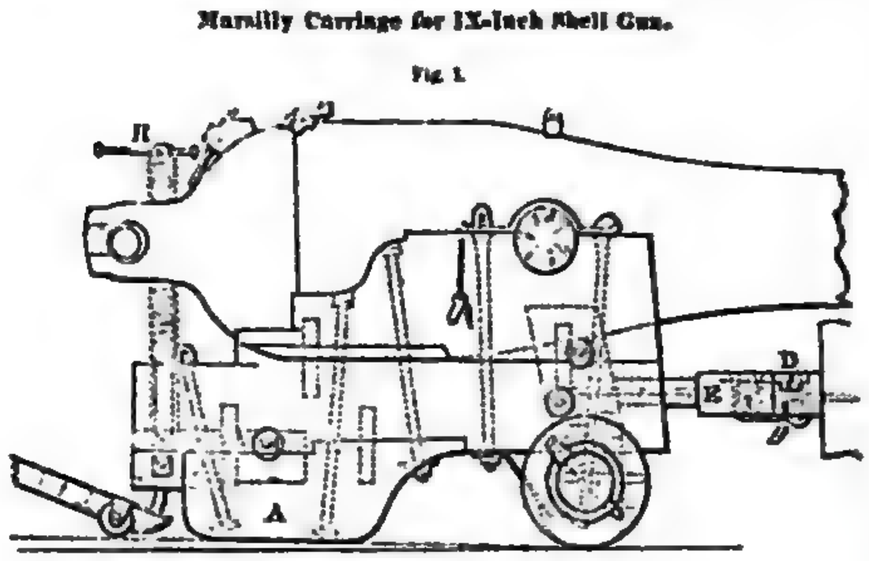
Recoil of the carriage was arrested by means of friction produced by an eccentric shaft running across the carriage. The shaft had levers attached to its ends; they pressed two compressor blocks down on the upper surface of the slide; at the same time, there were clamps which projected a short distance under the slide. When the levers were hove down, the slide was compressed between the compressor blocks on the upper slide and the clamps on the under side. Training the gun was made easier by the presence of training trucks attached by a bronze box to the rear underside of the slide.[45]

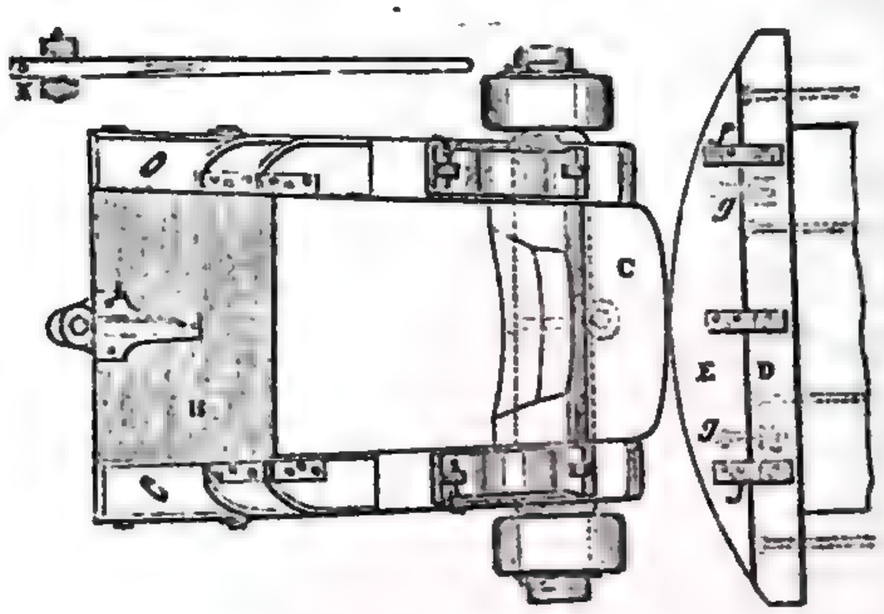
Far more successful was the Marsilly carriage which was in use in the French Navy by the mid-eighteenth century. John Muller was sufficiently impressed at that time to have copies made and to conduct experiments with them. Muller described the Marsilly carriage as nearly the same height as the common truck carriage; but, in order to lessen the height of the side pieces, the trucks had been made larger. There were no steps in the brackets and there was a transom at the rear for the stool bed to rest upon (instead of the hind axletree in the common carriages). Muller noted, "These carriages do not recoil so much, and are more readily pointed, because the trucks are not tight to their axle-tree. When they are traversed but a little, the carriage will move without the truck and then fall back again as soon as the handspike is taken away."[46]

44. Simpson, *A Treatise on Naval Gunnery*, p. 139.
45. Ibid., pp. 140-41.
46. Muller, *A Treatise of Artillery*, p. 98.

Ultimately, the French adopted a modern version of this carriage for their heavy broadside guns and the U.S. Navy followed suit, selecting it in the 1850s for the new IX-inch Dahlgren shell guns in broadside (see fig. 4).

The roller handspike made the Marsilly carriage easier to train. In recoil, more weight was put on the hind dumb-trucks than that bearing on them when at rest. This helped check recoil, although the Marsilly carriage would damage decks if they were not of oak or hard yellow pine.





A. *The hind plate of the Bracket, in place of rear truck of ordinary Carriage.*
B. *Rear Transom, in place of rear axle.*
C. *Breast-piece.*
D. E. *Sweep-pieces fixed.*
D. *Fixed below the Port-sill.*
E. *Handle, with brass collars (f. f.) and bolts and eyes (g. g.)*
H. *Elevating screw and bolt, with screw (I), in place of bolt and quoin.*
K. *Roller Handspike.*
L. *Loop for Handspike.*

FIG. 4. MARSILLY CARRIAGE

Ordnance Instructions, 1860

The roller handspike was used to return the gun to battery if to windward or on an even keel. On the leeward side, with a lot of heel, the handspike was not used; the friction of the hind dumb-trucks checked the movement of the gun to the extent that it would bump into the side of the ship without damage.

In his published instructions to captains regarding exercise of his new IX-inch guns, John Dahlgren noted: "The IX Inch Gun Carriage has many advantages over the common truck carriage; but you must not expect to find these out immediately; therefore, don't be in a hurry to condemn it. Upon just such a carriage five shells have been fired from that gun in 2 minutes 39 seconds, the average interval being 39¾ seconds, the number of men 12, and the gun handled in all respects as customary on ship board."[47]

A Marsilly carriage and its IX-inch Dahlgren gun —the largest commonly employed in broadside by the U.S. Navy during the Civil War—weighed upwards of five tons,[48] yet they could be moved together from one side of a frigate to the other in less than two minutes.[49] As one contemporary observed, "This is the only carriage that has ever superseded to such an extent the old four-truck carriage in our service, and this has not been adopted until experience had fully proved its great merit."[50]

On the IX-inch Marsilly carriage the elevating screw was so made as to have one complete turn equal to a degree of the quadrant. It was capable of elevating the gun 19 degrees and depressing it 8 degrees but as the gunports would only allow 10 degrees of elevation and 7 degrees of depression, the transom was scored so as to keep the gun within limits and prevent the muzzle from striking wood at either the top or bottom of the port.[51]

It was the Marsilly carriage that was the model for the wrought-iron broadside carriage introduced in the U.S. Navy right after the Civil War.

From the earliest days of cannon on board ships, some large guns were mounted on slide carriages to fire forward. This was especially true of the Mediterranean galleys. A "Corsica Mount" of this type is shown in a drawing by Pietro Sardi published in 1689.[52] Slide carriages came to have two parts: the top was simply the old truck carriage in form but with the trucks removed; and the bottom was the slide on which the brackets moved. The guns were trained by turning the entire vessel.

Such carriages were in use for bow chaser cannon on American naval vessels of the War of the Revolution. The earliest extant U.S. Navy slide carriage is that of Continental Navy gondola *Philadelphia*.

On firing, the gun recoiled backward in its carriage on the slide rails or skids. The latter might be inclined to help reduce the recoil and make it easier to return the gun into battery when it was loaded. There is no apparent incline on the skids of *Philadelphia;* recoil would have been absorbed by friction, breeching, and—if necessary—the crosspiece at the end of the slide.

On some U.S. Navy gunboats by the early nineteenth century the slides were pivoted; but often this meant the bowsprit would have to be removed in training the gun.[53]

Later, guns to be fired at higher elevations than the gunports would allow were also mounted on pivots, with the slide being secured to a pivot bolt at one end.

Frequent use was made of pivot mounts in the period before the War of 1812. These were utilized for both long guns and carronades. The most common pivot mount consisted of a metal ring, known as a "circle," from nine to twelve feet in diameter on the deck and brought level by means of a wooden foundation. The metal circle was shaped like a shallow U to hold the rollers attached to the bottom of the skids. The skids were secured to the deck by means of a bolt or a pin which passed through the center chock and was secured to a heavy timber underneath the deck. As this was the point of greatest strain, the pivot bolt was supported by a cast metal socket and plate set in the deck. The bottoms of the brackets rested in rabbets on the upper and inner sides of the skids. The carriage might also have rollers. The skids were moved around by means of

47. John A. Dahlgren, *A Few Hints to Captains of the New IX. Inch Shell Guns* (Boston: Printed for the Bureau of Ordnance and Hydrography, by Ticknor & Fields, 1856), p. 9.

48. Ward, *Elementary Instruction in Naval Ordnance and Gunnery*, pp. 164-65.

49. The result of trials conducted on board frigate *Merrimac*, noted in Simpson, *A Treatise on Naval Gunnery*, p. 131.

50. Ibid., p. 132.

51. Dahlgren, *A Few Hints to Captains of the New IX. Inch Shell Guns*, p. 9.

52. William L. Rogers, *Naval Warfare under Oars, 4th to 16th Centuries* (Annapolis: The U.S. Naval Institute, 1940), p. 338.

53. Howard I. Chapelle, *The History of the American Sailing Navy. The Ships and their Development* (New York: Bonanza Books, n.d.), p. 205.

handspikes and recoil was restrained by breeching running from the breech of the gun to ringbolts set in the deck or to bulwark stanchions. Breechings of smaller guns were secured to the ringbolts in the deck or the rail.[54]

There were a great many variations on the pivot mounts.[55] During the War of 1812 an improved version appeared, permitting its use in vessels with high bulwarks. The pivot bolt was located on top of an upright wooden post and the skids were fastened to it not in the center but at their after ends. At the forward end of the skids there were trucks, mounted so that the skids were elevated at a level with the pivot. The carriage was unchanged. This was not a strong mount and as a result it was confined for many years to carronade use. Later, long guns up to 18-pounders were mounted in this manner. Employed chiefly in schooners, the main advantage of this new mount was that the gun was now located well outboard when ready to fire. This minimized the danger from the muzzle blast, a particular problem with the short carronades. This new pivot mount was usually located amidships.[56]

The pivot mount was particularly important in the nineteenth-century shift away from arming vessels with as many guns as possible to arming them with a few heavy cannon. This trend, which began in the early nineteenth century, was accelerated by the new steamers, armed with shell guns.[57]

By 1850 a new carriage designed by Colonel Bomford for heavy shell guns had been adopted, with modification, for use aboard U.S. Navy bomb brigs. It was capable of allowing 35 degrees of elevation for the gun.

The slide was similar to that for the usual circular pivot mount. The top carriage was modified only in the application of a roller-shaft under each end of the carriage. By means of a lever, one man could lift either end of the carriage clear of the friction plates; only six men were required to run out and train these large guns. An illustration of the carriage shows it mounting a model 1844 army columbiad.[58]

Friction clamps at the side checked the carriage recoil, and the breeching was snatched in a crotch in the tail of the cheeks, leaving the breech clear, a superior arrangement to the old circle mounts.

Elevation of the pivot-mounted columbiad was accomplished by means of a ratchet device. The breech formed the arc of a circle with its center on the trunnions of the gun. This arc was divided by means of notches into which a steel check was spring pressed. Elevation was determined by a lever on the standard against which the spring abutted.[59]

By 1860 a slightly modified version of this carriage was employed for the pivot-mounted XI-gun Dahlgren gun and later for some Parrott rifles aboard ship (see fig. 5). In this pivot carriage the top was modified in that the axletrees were replaced by three transoms: front, middle, and rear. The lower part of the transoms formed a plane which rested on the slide and, by their friction against it, modified the recoil. There was also a fourth transom, known as the breast transom, which was located much as the transom in the old truck carriage. The top carriage also had metal friction rollers, front and rear. These were held on the carriage by journal plates.

The slide was virtually unchanged, consisting basically of two rails on an inclined plane with slats extending from the lower edge of the one to the lower edge of the other. The rails were fitted into front, middle, and rear transoms. Attached to the lower part of the front and rear transoms were rollers on axles. Those of the front transom were used for shifting and those of the rear transom for training. At first there was no roller under the middle transom, but as the length of the slide caused it to sag at that point, by 1860 a single roller had been added there as well.

Projecting from the outside of the rails were flanges or compressor battens, one on each side. The lower lip of the compressor took under this batten, and the upper bearing was in a socket let into the upper surface of the middle transom of the carriage. Compression of the batten between the carriage and the lower lip of the compressor was carried out by means of a screw.[60]

A preventer breeching kept the gun from rolling too far on its carriage when the gun was run out to leeward. To run the gun to windward, the carriage was released from all checks and the gun crew pulled on the outtackles taking advantage of the roll to windward. Care

54. Ibid., pp. 238-39.
55. See Ibid., p. 239.
56. Ibid., pp. 319-20.
57. Ibid., pp. 421-22.
58. Warren Ripley, *Artillery and Ammunition of the Civil War* (New York: Van Nostrand Reinhold, 1970), p. 74.
59. Jeffers, *A Concise Treatise on the Theory and Practice of Naval Gunnery*, pp. 50-52.
60. Simpson, *A Treatise on Naval Gunnery*, pp. 137-38.

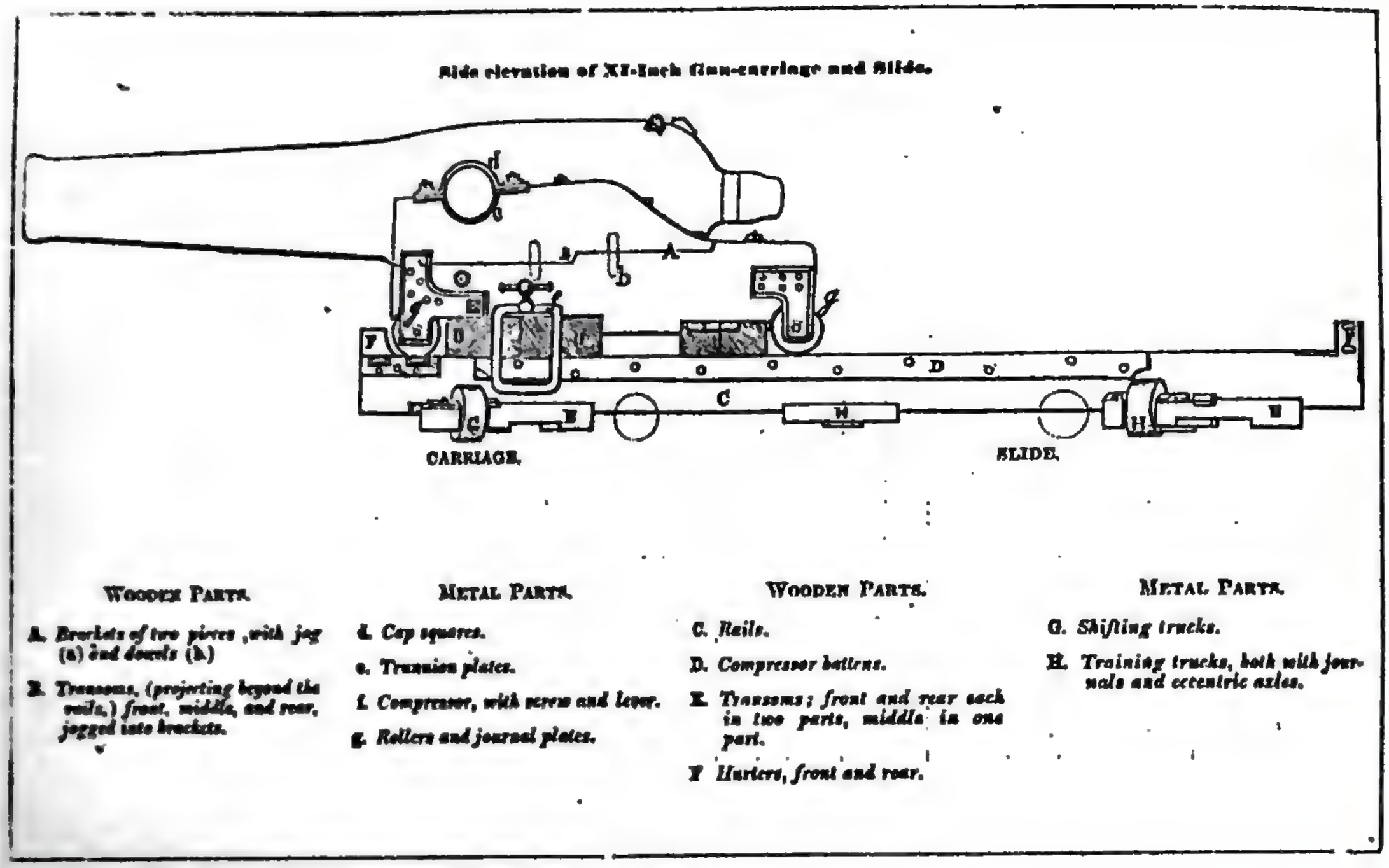


FIG. 5. XI-INCH DAHLGREN ON SLIDE CARRIAGE

was necessary; a XI-inch gun and its pivot carriage weighed 20,000 pounds.[61]

It was carriages such as these that held the XI-inch pivot guns of *Kearsarge* in her January 1864 battle with *Alabama*.

Apart from the mounts already discussed there were the carriages for the Dahlgren boat howitzers (in both launch and field configurations) and the heavy iron carriages for the Civil War XIII-inch mortars and Dahlgren XIII-inch and XV-inch guns (as well as the famous XI-inchers of *Monitor*) aboard the Union monitors. These latter carriages and their mammoth guns really belonged to a new era. In the Civil War they encroached on the smaller guns which were still mounted on the standard wooden truck carriage which had served the U.S. Navy so well for such a long period of time.

61. Brandt, *Gunnery Catechism as Applied to the Service of Naval Ordnance*, pp. 46-47.

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The Ship *Sooloo*(II) of Salem 1861-1887: History and Research for Building a Model

ROB NAPIER

Sooloo's History

JOHN TAYLOR was a consistently productive shipbuilder who worked in the Boston area. He built an assortment of brigs, barks, schooners, and sloops. Three small steamers slid down his ways. Primarily, though, he built merchant sailing ships. In 1838 he founded his yard in Medford where he built thirty-two vessels averaging 386 tons. In 1850 he moved the business to Chelsea and built another seven that averaged 944 tons. He made his final move just two years later to East Boston where he was able to build larger vessels. From 1853 until 1886 he built forty-seven more that averaged 1,028 tons. In 1872 Taylor took his son Justin into partnership and Justin continued the business after his father retired. In all John Taylor built eighty-seven vessels. *Sooloo* was the fifth of eight ships ordered by the Salem merchant company first known as Stone, Silsbee and Pickman.[1]

Originally, in 1798, the partnership had been named for its main constituents Robert Stone, Nathaniel Silsbee, and Dudley Leavitt Pickman of Salem. The principal partners changed with the generations, but the firm retained the name Stone, Silsbee and Pickman until 1860. At this time the Stone family left the company and its name became Silsbee and Pickman. It remained thus for three years. In 1863 George H. Allen, a longtime company clerk, was made a partner. The firm's name then changed to Silsbee, Pickman and Allen, which endured until its dissolution at the age of one hundred years in 1898. Initially the company was formed "for the purpose of purchasing ships and the sale of imported cargo." But "by the late 1870s their major concern began to shift from shipping to investments in railroads and banking."[2]

During its existence the firm owned and operated twenty-seven vessels in the Far East trade. They chartered many more. One of the former, incidentally, was another ship named *Sooloo*. She was built in 1840 and was lost on a reef off Analaboo Point on Sumatra in 1855. The subject of this discussion, therefore, is actually *Sooloo*(II).

Sooloo was ordered by Silsbee and Pickman early in 1860. They must have seen the clouds gathering for the American Civil War. The need of the Union navy for rope, and thus for hemp, would be great. The economy was depressed during the last half of the 1850s and unstable with the threat of conflict. There was risk of

1. Vessels Built by John and Justin L. Taylor, 1838-1886, undated, PMS.

2. History, SS&P, Manuscript Collection Registers, EI.

NOTE

The papers in the Essex Institute's Manuscript Collection No. 63, Stone, Silsbee and Pickman Records, 1816-1903, are divided into three main groupings: Account Books, Correspondence, and Shipping Papers. In the notes I have listed documents' locations in this collection to the level of these groupings.

Abbreviations

EI	James Duncan Library, Essex Institute, Salem, Massachusetts
NA	Vessel Documents, Bureau of Marine Inspection, National Archives, Washington, D.C.
PMS	Peabody Museum of Salem, Salem, Massachusetts
SS&P	Stone, Silsbee and Pickman Records, 1816-1903, MSS #: 63.

loss to a poor business climate, and later to Confederate raiders. Therefore *Sooloo* was a conservative ship. At 784 tons she was the smallest vessel ordered by the firm from John Taylor, either before, during, or after the war. In fact, she was 500 tons smaller than the 1,200-ton average of the eight Taylor-built ships they owned.[3] As the investment proved to be worthwhile, Silsbee, Pickman and Allen ordered a second ship for the hemp trade, *Mindoro*, which was launched in 1864. A third ship, *Panay*, was added after the war in 1877 to make this group of three ships built "primarily as carriers of hemp, used in New England in the manufacture of Manila hemp rope, although the vessels often carried sugar on their homeward runs."[4]

It is interesting to compare the sizes and costs of these three ships. But to do this their tonnage must be made comparable. In 1861, when *Sooloo* was built, tonnage was computed from the old measurement law. This did not take into account whether a vessel was full- or fine-bodied. In 1864 a new system was implemented which was considered more equitable. It did have allowances for vessels of differing models. By the old system *Sooloo* measured 784 92/95 tons. By the new system she measured 962.76 tons. Neither *Mindoro* nor *Panay* were measured in old tons. In table 1, tonnages are in New Measurement. It will be seen that *Mindoro*'s cost per ton was about twice that of *Sooloo* and *Panay*. This must reflect a highly inflated wartime economy.

Table 1

COMPARISON OF VESSEL COST BY TONNAGE

Year Built	*Vessel*	*Tons, N.M.*	*Total Expense*	*Expense per Ton*
1861	*Sooloo*	962.76	$ 55,079.97	$ 57.21
1864	*Mindoro*	1,021.65	123,607.34	120.99
1877	*Panay*	1,190.18	74,582.75	62.66[5]

Four men held a total of sixteen shares of interest in *Sooloo* while she was being constructed. They were William D. Pickman with eight-sixteenths; Benjamin H. and John H. Silsbee, each with three-sixteenths; and George T. Silsbee with two-sixteenths. When George H. Allen became a partner in 1863 he gained one sixteenth share in *Sooloo* while William D. Pickman's interest dropped to seven-sixteenths. Although Pickman's was the largest holding in the vessel,[6] it was Benjamin H. Silsbee's signature that appeared on most of the documents concerning her. Correspondence, bills, and telegrams were addressed to him. He signed checks and drafts on the ship's account. He seemed to be the man who made *Sooloo* happen on a day-to-day basis.

It was Benjamin H. Silsbee who contracted with John Taylor to build the vessel for $35,000.[7] This was for the hull and spars alone. It is surprising to learn that this did not include much of what we think of as parts of a ship. Some of the items made and purchased for her from outside sources in the Boston area are shown in table 2.

Table 2

REPRESENTATIVE COMPONENT COSTS FOR *Sooloo*

Windlass	$ 225.00
Iron knees	200.00
Iron for fastening and for the rig	421.00
Yellow metal for coppering	2,486.21
Nails for coppering	400.00
Felt for coppering	31.37
Rigging materials	3,176.09
Rigging labor	594.25
Duck for sails	1,421.24
Sailmaking	748.85
Anchors and chain (including chain for rig)	1,809.24
Salt and salting	190.35
Six compasses and a clock	48.43
Two 24-ft. cutters and one 24-ft. yawl	292.50
Twelve spare spars	211.50

After Silsbee and Pickman paid off the builder and his subcontractors, the chandlery, the crew's, mate's and captain's advances, insurance, the charter's commissions, and even the pilot, *Sooloo*—outbound on her first voyage—cost a total of $55,079.97.[8]

This was $70.158 per ton, O.M. Of the overall costs the construction of the hull and spars was obviously the greatest outlay, both on per ton and actual bases. The $35,000 contract price paid to Taylor reflected a

3. Vessels Built by John and Justin L. Taylor, 1838-1886, undated, PMS.

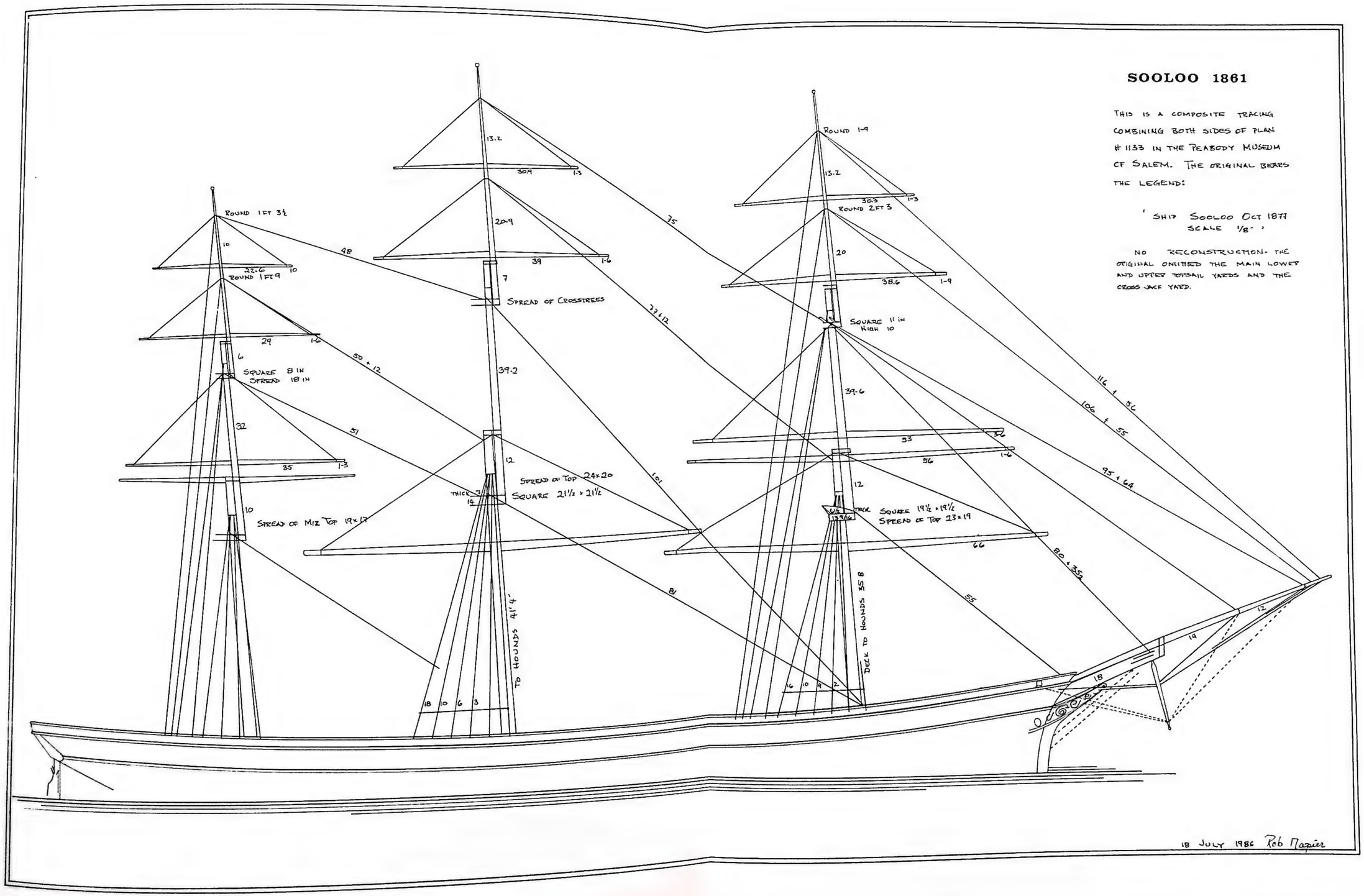
4. William Armstrong Fairburn, *Merchant Sail*, 6 vols. (Center Lovell, Maine: Fairburn Marine Educational Foundation, Inc., 1955), 4, 2456.

5. Account of Building Costs Ship *Sooloo*, undated, Account Books, SS&P, EI. I dubbed this document the Launch Booklet; and Fairburn, *Merchant Sail*, 6, 3956.

6. *Sooloo* 1861, Certificate No. 190, NA.

7. Taylor Invoice, 1 May 1861, Account Books, SS&P, EI.

8. Account of Building Costs Ship *Sooloo*, undated, Account Books, SS&P, EI.



SOOLOO 1861

THIS IS A COMPOSITE TRACING COMBINING BOTH SIDES OF PLAN # 1133 IN THE PEABODY MUSEUM OF SALEM. THE ORIGINAL BEARS THE LEGEND:

'SHIP SOOLOO OCT 1877
SCALE 1/8"'

NO RECONSTRUCTION- THE ORIGINAL OMITTED THE MAIN LOWER AND UPPER TOPSAIL YARDS AND THE CROSS JACK YARD.

18 JULY 1986 Rob Napier

expense of $44.586 per ton, or 63.5 percent of the total expense. The next most expensive portions were the materials and labor for rigging at $4.803 per ton, the copper and coppering at $4.062 per ton, and the duck and sailmaking at $2.764 per ton. Advances paid to the ship's company totaled $1.234 per ton with most other items falling below $1 per ton.[9]

Silsbee and Pickman figured costs of their vessels to the nearest tenth of a cent. This was about one ten-millionth of a vessel's overall cost. Costs per ton were figured and entered longhand for *every* item in records of *Sooloo*'s building. The partners were careful with their pennies. Nearly every receipt bears a notation for a 2 to 4 percent discount for payment in cash. Many entries also included a small charge for cartage or drayage of goods to the ship when building, thus adding a human sense of hustle-bustle to the otherwise dry records.

The product of disbursements for *Sooloo* was a vessel whose Certificate of Registry officially described her as having "two Decks and three Masts and that her length is One hundred Sixty Seven feet/ her breadth Thirty one eight and nine tenths ins./ her depth Twenty three feet and . . . that she is a ship/ has a square stern, no galleries and a billet head."[10]

Further, she was listed in *American Lloyds' Registry of American Shipping* as being of the "First Class, Second Grade." This implied "confidence for the transportation of perishable cargoes on long voyages." Interpretation of other keyed data indicates she was of medium model with a half-poop, built of oak, fastened with copper and iron, and coppered.[11]

Sooloo spent about one year a-building. The launching was at a quarter to five in the afternoon of 1 May 1861.[12] Boston newspapers were overflowing with accounts of battle in the South: regretfully there remained no room for news of the launch of another small local merchant sailing vessel.

After only a month fitting out she sailed on her maiden voyage. She left from Boston's India Wharf, which was to become her customary departure point over the years. She was directed to sea by a pilot from Martin & Colby's 1846 schooner *Coquette* for $29.49. This figure was based on *Sooloo*'s draft of nineteen feet six inches.[13]

Silsbee and Pickman entrusted *Sooloo* to the charge of Capt. Charles H. Allen, Jr., for her first voyage. He was the nephew of another captain of the same name. They both commanded vessels for Silsbee and Pickman. In fact, when a boy, *Sooloo*'s Captain Allen spent three voyages under his uncle. To confuse matters further, George H. Allen, the clerk who became a partner in the firm in 1863, was the earlier Captain Allen's son and a first cousin to *Sooloo*'s captain. A genealogical chart illustrating these relationships is shown in table 3. Although *Sooloo* was his first command, Captain Allen had accumulated a great deal of experience as an officer in ships in the Far East as well as in Californian gold-mining fields during 1849-1851.[14]

Sooloo's owners chartered her to Nath'l Winsor and Co., for her maiden voyage for San Francisco. She carried 1,405 1/4 tons of general merchandise supplemented with 217 tons of pig iron and steel, and 252 14/20 tons of coal. This freight, charged at different rates for different items, cost Winsor's Regular Line $16,575.01. She arrived safely at her destination 8 November 1861 and discharged. She then briefly worked the Californian and Mexican coasts in a manner reminiscent of *Pilgrim* and *Alert* in Dana's *Two Years Before the Mast*. Managing to avoid contact with Confederate enemies, *Sooloo* returned to Boston via European ports and New York. This was her only passage around Cape Horn; subsequently she sailed to the East by way of the Indian Ocean.[15]

In 1864 Captain Allen left *Sooloo* for a new assignment: the command of Silsbee, Pickman and Allen's recently completed ship, *Mindoro*. He was relieved by Capt. Daniel H. Hutchinson, a native of Nova Scotia. Hutchinson, "a most energetic Captain," may be credited with *Sooloo*'s sole claim to a speed laurel. The passage was made during her third voyage. After discharging 1,800 tons of lumber and general cargo, *Sooloo* departed Melbourne 15 June 1864. She was light, carry-

9. Ibid.

10. *Sooloo* 1861, Certificate No. 190, NA.

11. *American Lloyds' Registry of American and Foreign Shipping* (New York: E. & G. W. Blunt, 1864), p. 99.

12. Ibid.

13. Receipt for Pilotage from Schooner *Coquette*, 1 June 1861, Shipping Papers, SS&P, EI.

14. John Price, *Genealogy of the Allen Family of Manchester, Mass., from the Earliest Settlement to the Year 1886* (Salem: The Salem Press, 1888); *Salem Evening News*, 6 December 1910; and History, SS&P, Manuscript Collection Registers, EI.

15. Cargo and Charter of Ship *Sooloo* from Boston to San Francisco, June 1861, Shipping Papers, SS&P, EI; Charles Beadle, Journal of Two Voyages, 12 February 1864-18 February 1867, entry dated 2 June 1861, PMS; and Log, Ship *Sooloo*, June 1861-October 1862, PMS.

Table 3

ALLEN FAMILY CHART

William Allen
b. 3 December 1766

Charles H. Allen 31 July 1810 - 28 May 1899 [Captain for Silsbee & Pickman, but not in *Sooloo*(II)]	William E. Allen 10 July 1806 - 7 November 1837
George H. Allen 15 January 1838 - 30 April 1925 [The clerk who became a partner in 1863]	Charles H. Allen, Jr. 26 March 1830 - 5 December 1910 [Captain of *Sooloo*(II)]

Sources: Price, *Genealogy of the Allen Family of Manchester;* and Putnam, *Salem Vessels and Their Voyages*, ser. III (Salem: The Essex Institute, 1925).

ing only 217 tons of ballast. She was bound for Calcutta on the Hooghly River in India and arrived there 26 July.[16] "The run from Melbourne to Sand Heads (mouth of the river Hoogly) was made in 36 days, which is believed to be the shortest passage on record between those places. Considering that the Sooloo was never regarded as anything more than a common sailer, the above prompt dispatch is extraordinary."[17]

Once in Calcutta, which is roughly seventy-five miles up the Hooghly from the Indian Ocean, *Sooloo* was hauled into the Union dry dock for repairs to copper which had scraped from her bottom in Melbourne. Then her entire rig was overhauled. She was still waiting to offload ballast from Melbourne when, three months after her arrival, on 5 October 1865, there was a "terrible Cyclone which destroyed a vast amount of property and in which a number of lives were lost." These words are from the particularly flowing and legible journal of Charles Beadle, *Sooloo*'s mate for two voyages. He continued:

> Wednesday October 5th Morning, fresh breeze from the northward gradually increasing with a gloomy overcast appearance. At noon blowing a hard gale and still increasing with heavy rain employed in securing the windlass and bitts with tackles to relieve the strain of the moorings. At 1.30 blowing a hurricane the wind hauling gradually to the eastward with heavy rain squalls. The two ships (Governor General of Liverpool and a French ship named Gustave & Lewis) inside broke from their moorings driveing alongside us with a terrible crash. We soon after broke loose, and driveing into the ship west of us (Romania of Liverpool) drove here into the outside ship (Southern Belle) and we all swung off to the wind, we still holding by one chain of the bow moorings, the other haveing parted from the buoy. One ship outside us, the Romania being moored to the same ring in the moorings haveing parted them lay fast to us during the latter part of the gale cuting our bow badly with her chain, and damageing our side, bulwark and rigging badly with her anchor, which was lashed at her cathead. All possible means were used to save the ship by means of fenders and otherwise as the case seemed to require during the Gale. The gale was at its height at 3 P.M. the wind then about south and continueing to veer to the south and west, moderateing. After 4 P.M. as the wind veered to the westward we swung in on shore, one ship inside of us. And as the tide went out left us just to take the ground, and in the night about 1 A.M. a bore of tide comeing up the river caught our bow suddenly and parted the chain by which we were fast to the ship on shore, and swung us off into the ship outside carrying away our lower fore topsail yard and doing considerable damage to both ships by the anchor at the cathead and our stern outside moorings being fast together sprung our rudder off sufficient to tear the bands from the sternpost. A great deal of damage was done during the gale by grinding along side each other.
>
> Thursday 6th Made the stern fast to two buoys with hawsers. The moorings haveing parted that the starboard chain was fast to, hove the chain in and shackled it on to the anchor. The Sooloo the only American Ship in Calcutta flying the American flag. The others haveing sunk or gone ashore so that they could not be got off.[18]

This cyclone was the only event in *Sooloo*'s long

16. *Salem Register*, 7 February 1859, and Beadle, Journal, miscellaneous entries dated June and July 1864.

17. *Salem Register*, 7 February 1859.

18. Beadle, Journal, entry dated 5-6 October 1865.

FIG. 1. *Sooloo* in the Hooghly River, Calcutta, after the cyclone on 5 October 1864. The photographer is unidentified. (Courtesy of the Peabody Museum of Salem.)

active life which both occurred in a foreign port and of which a photograph survives. Figure 1 shows the bank of the Hooghly after the cyclone. *Sooloo* is the central vessel with her bow directly toward the camera. The two other central vessels are *Romania* and the American *George Laws*. Judging from Beadle's description and the photographic image, the Hooghly River was a complete disaster. *Sooloo* was surely in better condition than any of the other vessels visible.

But this was not the end of trouble and costly delay. The ballast from Melbourne had to be offloaded in *Sooloo*'s two 24-foot yawls because the larger local lighters were destroyed in the storm. The ship was moved to Union dry dock again, this time to repair cyclone damage. Fortunately, because she survived in relatively good shape, she was first into the dock. It was not until 9 December that she was ready to take aboard cargo. Nineteen days later she was laden with 17,588 bags of rice for Bombay. She left Calcutta and after four more collisions, one quite damaging, dropped the pilot off Sand Head on 7 January 1865. *Sooloo* had been wrestling with the Hooghly for five and a half months. By comparison, her next layover in Calcutta later that same spring was only thirty-five days, pilot to pilot.[19] The disaster-loaded turnaround in Calcutta could not have been profitable. The owners did not discredit *Sooloo*'s master, though. Years later George H. Allen said that

> Captain Hutchinson was one of our best captains. He was a remarkable shipmaster, with rare presence of mind, always cool and the man for an emergency. His handling of the *Sooloo* when she was driven ashore in the borer at Calcutta . . . displayed the very best seamanship and won the highest commendation. . . . On his return from one of his voyages

19. Ibid., entries dated between 23 July 1864 and 7 January 1865; entry dated 1 April 1865; and entry dated 11 May 1865.

the papers . . . said that he brought home with him every member of the crew that started with him—a most unusual occurrence.[20]

Despite harsh weather and unfortunate incidents, the men who sailed *Sooloo* kept her with pride. A Boston newspaper reported in February 1868, after her fifth voyage, that "notwithstanding . . . having been exposed to the severe storms of winter since her arrival on the coast, she has been kept in excellent order, from the trucks to the water's edge. She [was] more like a royal yacht in neatness than a merchant ship." And when in Australia during her thirteenth voyage, on 2 November 1876, the Melbourne paper reported that "Soo Loo, an American bottom, which was here some three years ago, has again arrived in port, in all the brightness of her newly-scraped spars and fresh paint she looks almost as good as new, although a 15 years' old ship, and is evidently a well-cared for property."[21]

Notice how the Australian paper spelled *Sooloo* in two words: *Soo Loo*. There was a vessel with this name, but this reference is undoubtedly to *Sooloo*(II) because the dates of both visits mentioned in the clipping are corroborated by her logs.

Captain Hutchinson's place in the main cabin was relinquished in 1874 after eight voyages. The place was given by the partners to his mate John H. Shatswell, who was from Ipswich, Massachusetts. He directed only three passages before Capt. Charles H. Allen, Jr., resumed command of the ship in 1876.

Sooloo worked for twenty-six years as a merchant ship. She made all but the first of her twenty Pacific voyages to the Far East. She primarily hauled cargoes between Boston and the Philippines. But she also carried freight between Eastern ports, perhaps taking advantage of favorable markets while awaiting the monsoon or better deals on lading for home. In her time she carried bags of rice, saltpeter, and cutch; bags and pockets of linseed; bales of cow, buffalo, and Madras goat hides; bales of jute and gunny bags; cases and boxes of shellac, cases of copper, bags of nails, bars of silver and specie, and boxes of cigars. She carried piculs of sapan wood and lighter loads of brasil wood. She carried ice.

Ports she called at included San Francisco, Mazatlan, Macapule, Bella Vista, Cork, Bremerhaven, New York, Hong Kong, Melbourne, Calcutta, Bombay, Yokohama, Bangkok, Batavia, Whampoa, Sourabaya, Probolingo, Pasuran, Cebu, Manila, Iloilo, and, of course, Boston. Ironically, for all the places *Sooloo* visited, she never did call at her own port of registry, Salem, which "as a seaport died hard." The city's flourishing hemp and sugar trade had been opened by Henry Prince in 1796 in the ship *Astrea*.[22] But by the time *Sooloo* sailed the seas Salem was no longer an international marketplace. Nonetheless, she worked hard for home port citizens and having carried lots of things to lots of places was, after all, built for carriage of hemp to Boston.

And this she did. She made nine trips bringing hemp alone and three bringing about half hemp and half sugar. Only four trips were made for sugar alone. During eight of the trips carrying hemp or hemp and sugar she also brought home a dividend of four or five hundred piculs of sapan wood. She had nestled into this routine by her fourth voyage which commenced in 1865. From then on she neglected to call in the Philippines only once. This was during a round trip to three Javanese ports for sugar in 1872-1873.

A typical voyage was *Sooloo*'s sixteenth. Silsbee, Pickman and Allen recorded the details of each voyage's business in a little booklet. A booklet's format lends itself to following one voyage's progress from its midpoint. *Sooloo* sailed from Manila 3 May 1881, under Captain Allen. She was laden with 6,280 bales of Manila hemp. In Manila a bale of hemp weighed 280 pounds and measured ten cubic feet. Bales were the unit for handling, stowing, and selling hemp. But its purchase price was determined by the picul. A picul was the load one man could carry; it was a unit of weight between 132 and 140 pounds. Thus this cargo was also reckoned at 12,560 piculs of Manila hemp. Hemp was shipped pressed, and if confined in a hold too soon after pressing could heat up to the point of combustion. Therefore a shipment was allowed to dry some weeks before stowage.[23] The 6,280 bales carried in this voyage represented seventeen different hemp dealers in

20. George Granville Putnam, *Salem Vessels and Their Voyages*, ser. 3 (Salem, Mass.: The Essex Institute, 1925), p. 59.

21. Account of Building Costs. These two quotes are from clippings found pasted onto the endpapers of this document. Sadly the newspapers that printed them were not named.

22. Samuel Eliot Morison, *The Maritime History of Massachusetts 1783-1860* (Boston: Houghton Mifflin Company, Sentry Edition, 1961), pp. 94, 217.

23. Chas. H. Hillcoat, *Notes on the Stowage of Ships* (New York: Colonial Publishing Company, 1918), p. 142.

Manila. Each dealer's bales were identified by a personal chop which resembled a cipher or monogram. These marks were drawn in Silsbee, Pickman and Allen's cargo booklets and were evidently their only records of foreign hemp and sugar merchants.

The overall cost of the load of hemp was $137,100.00. Charges for fire insurance, boat and coolie hire for discharge and shipping of cargo, wharfage, brokerage, commissions, consular fees, export and other duties, port tax, stamps, telegrams, and screwage amounted to $32,911.44. Of this the lion's share was for duty at $20,434.20. The net cost of the hemp was $104,188.56.[24] Payments were made in pounds sterling.

After sailing for just about six months, *Sooloo* arrived in Boston on 8 October 1881. She started discharging hemp at Union Wharf Monday 10 October and finished a few days later on 15 October. Then she was hauled over to McQueston's Wharf in East Boston.

Interestingly, the sale of *Sooloo*'s hemp did not have to await her presence in Boston. It opened on 16 May 1881, barely two weeks after the ship left Manila. This was possible because her captains kept, from the late 1870s, in communication with Silsbee, Pickman and Allen by coded telegram. One such, addressed to Silsbee and dated 14 July 1882 during the seventeenth voyage, read, "Abcession Sooloo accloyed congruous." This translated as "The Sooloo has arrived. Bought at your limit 1500 bales hemp."[25]

The date of the last sale of hemp from this cargo was 2 September 1881. By this time all but 330 bales had been disposed of. *Sooloo* arrived in Boston just over a month later. By 1 February of the following year the remainder was sold. The purchasers were the Plymouth Cordage Company, 2,000 bales; the New Bedford Cordage Company, 1,000 bales; the Boston Cordage Company, 500 bales; Sewall Day & Co., 2,000 bales; J. T. Donnell, 605 bales; the Pearson Cordage Company, 150 bales; and A. D. Nelson Sons, 25 bales.[26]

It worked out that the hemp cost the ship's owners $21.83 per bale and they sold it for $31.10 per bale. This amounts to a return of $9.27 per $21.83 invested, not including operating costs for *Sooloo*.

Outbound to the East Indies *Sooloo* frequently carried case oil. Oil was already used in many parts of the world for lighting and other purposes. When transported in sailing ships oil was packaged in tins of five American gallons. Two tins fit in a case. Thirty-two to forty cases could be loaded per register ton of a vessel.[27] *Sooloo* stowed roughly 27,500 cases, or twenty-eight cases per ton of this dangerous cargo. She left on her eighteenth trip in February 1882 after an average four-month layover in Boston. On 9 October of that year she was back in Manila for another load of hemp.

Sooloo discharged her last bales of hemp at Boston about 20 June 1884. On her remaining two voyages from the Philippines she brought "Iloilo Superior Sugar." Iloilo is the principal city on the Philippine island of Panay, at the northeast end of the Sulu Sea. This roughly rectangular body of water separates Borneo from the Philippines. Mindoro is another island in the Philippines directly to the northwest of Panay, at the very northern corner of the Sulu Sea.

Sugar's season of shipment from the Philippines was considered to be October through August. This large portion of the year provided vessels trading in the crop plenty of time for delays. It was not a cargo that had to be obtained in a timely fashion. From the Philippines sugar was packed in bags weighing between 56 and 112 pounds.[28]

These two voyages were sailed under the fourth and last man to command *Sooloo*. He was Capt. W. Frank Powars, another experienced Salem officer who worked for Silsbee, Pickman and Allen and who was familiar with the Far East.[29] During his second trip *Sooloo*'s life as a sailing ship ended. It was her twentieth cruise, and she was very nearly home on Sunday 22 May 1887, 151 days out from Iloilo, when the following was written into her log by the mate:

> This day commence with a moderate NW wind a hasy sky and a light swell from eastward at 3-30 PM the wind fell light and hauled in to NNW with the yards braced sharp up on the Port tack Ship heading NE and going about 3 knots through the water. at 4 PM the weather Set in with a thick fog a man was placed on the forecastle head to keep look out and sound the fog horn. The rest of the watch was stationed a midd ships on both Sides to keep look out and listen for other vessels fog signals. At 5-15 PM while me and the Captain was a supper the second officer Mr Fletcher was in charge of the deck.

24. Cargo Book, Voyage 16, Ship *Sooloo*, Account Books, SS&P, EI.

25. *Sooloo* to Silsbee, Telegram dated 14 July 1882. Correspondence, SS&P, EI.

26. Cargo Book, Voyage 16, Ship *Sooloo*.

27. Chas. H. Hillcoat, *Notes on the Stowage of Ships* (New York: Colonial Publishing Company, 1918), p. 178.

28. Ibid., p. 217.

29. *Salem Evening News*, 10 December 1917.

The man on the look out reported a vessel on the lee bow the second officer at once put the ships helm hard up but the schooner still kept his course with the wind free heading right for the ship. when i heard the man sing out on the forecastle head i run on deck at once and saw a schooner headed right for the ship. i could not see anyone about the schooners deck. When all of a sudden the schooner struck the ship fore part of the fore rigging and carried away Bulwarks & stanchions chain plates top mast & top gallant back stays & top gallant mast & yards came down then she swept along towards the main rigging and carried away fore sail and fore braces.

She struck the main rigging & top mast back stays & carried away main lower mast head above the eyes of lower rigging and every thing fell over the side. Then she struck the starboard Boat abaft the main rigging and broke the boat up & knocked skid down

Then she fetch up in the misen rigging & carried away misen top mast above the lower cap. & everything fell over the ships side. the all hands manage to shove the schooner a stern clear of the ship. Then all hands was send to save the spars and sails & get them in board. The schooner name is the Messenger of Saco maine bound to Port Royal South Caroline. the raimainder of the day light baffling airs & calm with a hasy sky and light variable swell

all hands employed rigging jury mast and geting sail on the Ship again So as to work the Ship in to the most convenient port on the american coast

Pumps Side Lights and look outs

Well attended[30]

The collision occurred at 39°39′ north latitude and 70°00′ west longitude. This is about 85 miles south of Nantucket and 160 miles south by east of New York City, on the edge of the continental shelf. The following afternoon the crew was fabricating a workable jury rig. Then, "at 6-P.M. [*Sooloo*] spoke Br [British] Steamer Hartington and he offered to tow the ship to vineyard for 1000 Lb sterling But Captain Powers would not consent to that." *Sooloo* managed to sail on her own to an anchorage off Gay Head where she took a tow with the tug *Elsie* into Vineyard Haven. The final entry in her log was made on 26 May 1887. The ink faded fittingly to nothing in the last line:

Fore and Main top gallant sails & Royals main Sail and Fore Sail & Main Top mast stay sail destroyed Several Stays and Back Stays Running gear & Blocks Destroyed & top gallant masts main & misen top mast main lower mast & fore Royal yard destroyed & part of the iron work lost. . . .[31]

Once in Vineyard Haven Captain Powars made a notarized statement which confirmed and amplified the report in the log. Then *Sooloo* was towed "in her crippled condition" to Boston by tugs of the Boston Tow-Boat Company for $400.00. She was secured at Union Wharf and there a very detailed survey was made by A. G. Whidden, a private surveyor, for $50.00. This included, at the request of owners and underwriters, estimates totaling $5,030.68 from various "competent men" for making the vessel good.[32] Silsbee, Pickman and Allen decided it was time to sell the ship.

It took them six months to wrap up affairs for their little vessel. The crew was paid off 4 June 1887. On 20 September the owners received payments totaling $4,476.58 for collision damages from the Washington Insurance Company, the Boston Insurance Company, the Insurance Company of North America, the China Insurance Company, the American Insurance Company, and the Merchant Marine Insurance Company. These were the six underwriters that currently held interest in *Sooloo*. In the marine insurance business it is usually the case that there are many carriers for an individual vessel. This spreads out loss with the result that one company does not bear the load of claims for an entire vessel and cargo.

On 20 October the Boston Tow-Boat Company paid Silsbee, Pickman and Allen $8,000 for *Sooloo*. She was gone but her account was not yet closed. In May the following year, 1888, $40,411.39 was paid to Union Wharf by the partners for duties on *Sooloo*'s cargo of sugar which they still controlled. They subsequently sold it in roughly equal portions to the Bay State Sugar Refinery and Boston Sugar Refinery during the summer of 1888 for $101,292.12.[33]

Despite the expenses of keeping the vessel idle in Boston for six months, and the administrative costs of selling her, Silsbee, Pickman and Allen still made out all right. The twentieth voyage, even though the vessel was wrecked, was a success.

The Boston Tow-Boat Company cut *Sooloo* down to a schooner barge, the fate of many ships no longer fit for duty offshore. Officially her designation as a ship changed to barge and her port of registry changed from

30. Log, Ship *Sooloo*, March 1886-May 1887, entry dated 22 May 1887, EI.

31. Ibid., entries dated 22, 23, 25, and 26 May 1887.

32. Captain Powars Statement at Vineyard Haven, 25 May 1887; Report of A. G. Whidden, Surveyor, 2 June 1887; Boston Tow-Boat Company Invoice to Ship *Sooloo* and Owners, 21 June 1887; and Invoice of A. G. Whidden, Surveyor, 18 June 1887, all from Shipping Papers, SS&P, EI.

33. Silsbee, Pickman and Allen Daybook, August 1884-February 1893, entries dated 20 June, 20 September, 20 October 1887, May, July-September 1888, Account Books, SS&P, EI.

RUNNING LIGHT SCREEN

BINNACLE/ SKYLIGHT
FORE AFT

COACH HOUSE AFT ELEVATION

24-FOOT SURF BOAT

COACH HOUSE FORE ELEVATION

LADDER

MAIN PIPE RAIL AND PUMPS

FORECASTLE ELEVATIONS
AFT FORE

34-FOOT YAWL

CAPSTAN - WINDLASS ELEVATION AND DETAILS

HATCH COAMING SECTION - 2x SCALE

MIDSHIP TYPE SECTION

SOOLOO

UNDERSIDE OF QUARTERDECK AT SIDE

UNDERSIDE OF MAIN DECK AT SIDE

UNDERSIDE OF LOWER DECK AT SIDE

DWL

SCALE IN FEET
40 30 20 10 5 0

OUTBOARD PROFILE

42 41 40 38 36 34 32 28 20 12 8 6 5 4 3 2 1 STATION NUMBERS

SOOLOO 1861

RECONSTRUCTION WITH HELP OF THE BUILDER'S HALF-HULL OF SOOLOO AND HIS SECTION OF FANNY; PHOTOGRAPHS OF SOOLOO BY STEBBINS, AND OWNERS' DOCUMENTS.

23 MAY 1985 P.G. Rogers

Salem to Boston.[34] A vessel thus converted usually had its rig removed except for the lower masts which were fitted for fore-and-aft sails, schooner fashion. Hatches were enlarged to ease handling of cargo. The barges were bulk-loaded and towed behind tugs, frequently in strings with other schooner barges. When possible they would use their sails to reduce the load on the tugs. Barges did not go unmanned; they required small crews to manage their lines, sails, and helms.[35]

Boston Tow-Boat used *Sooloo* to transport coal from Newport News, Virginia, to Boston until November 1892. On 14 November she and another schooner barge, *Storm King,* were being towed by the tug *Saturn.* They labored in heavy seas to clear Monomoy Point, the southern extremity of Cape Cod. They bumped the ground while trying to avoid the wreck of Vanderbilt's yacht *Alva.* The two barges foundered.

Sooloo's captain, Mr. Humphrey, his wife, and his crew of three or four took to the dory. They were picked up by men from the Monomoy Life Saving Station. The master, presumably his wife, and one crew member transferred to the tug *Underwriter* which was on the scene. They were taken to Vineyard Haven. The rest of the crew was cared for at Chatham Station with the aid of the Women's National Relief Association.[36] Salvage was considered, but the wrecks were considered total losses.

Sooloo was wrecked on shoals just to the south of Pollock Rip Channel 3,500 yards from Pollock Rip Lightship. Pollock Rip Channel connects Nantucket Sound with the Atlantic Ocean, between Great Point on Nantucket and Monomoy Point. Before digging of the Cape Cod Canal, Pollock Rip Channel was a thoroughfare for coastal traffic that came up the inside via Long Island, Block Island, Vineyard, and Nantucket sounds. This intersection had to be kept clear. The federal government, via the army, provided for removal of obstructions to navigation. The work was done by private contractors. C. W. Johnston of Lewes, Delaware, agreed to remove *Sooloo*. He had been working on a wreck nearby. By 29 April 1893, when Mr. Johnston was ready, there was not much left of *Sooloo* due to the ocean's winter scouring. He was able to do his work on her easily in a single day.

> During this day of field work about 60 pounds of dynamite were exploded around the wreck in small charges of from 10 to 30 pounds each, by which the remaining parts of the hull of the wreck were entirely broken up and scattered over the ocean bottom. A final inspection made on the same day showed that everything had been removed down to a level of 31 feet below low water, this being the general level of the surrounding bottom.
>
> No property of any value was recovered, and no attempt was made to do so, since the cost of such work would have been greater than the value of the material saved (either through the direct expense of such work, or the delay thereby caused to the main work of destruction of the wreck itself).[37]

This demolition set the taxpayers back $411.93.[38] It is perhaps unfortunate that Mr. Johnston did not retrieve a few artifacts; had the army stored them down to the present they could have realized a great profit on their investment of time and effort at current inflated values of marine antiques. It is interesting that *Sooloo*'s loss was only about eighty-five miles from her collision with *Messenger* five years earlier. Coincidentally, the schooner ended up on the beach at Cahoon's Hollow on Cape Cod in November 1894,[39] only about thirty miles from *Sooloo*.

Research for Building the Model

The model of *Sooloo* was constructed on a sound foundation of original documentation. The most important portions include the builder's half-hull model and some of his drawings, photographs of the vessel both underway and at pierside, engravings and tables defining scantlings, paintings, logs and journals kept on board, and scores of documents made and preserved by her owners.

Data defining the ship's shape and internal structure date from the time of her building. Data defining her exterior and rig date from her later life as a sailing vessel. The basic internal structure changed little compared to the more damageable and visible exterior. Thus, I have portrayed *Sooloo* as I felt she appeared between 1884 and 1887.

A half-hull model attributed to John Taylor resides

34. *Sooloo* 1887, Certificate No. 87, NA.

35. Paul C. Morris, *Schooner and Schooner Barges* (Orleans, Mass.: Lower Cape Publishing, 1984), p. 2.

36. *The* (Cape Cod) *Standard Times,* 18 November 1892; and *Annual Report of the Operations of the United States Life Saving Service for the Year Ending June 30, 1893* (Washington: Government Printing Office, 1893), p. 63.

37. *Annual Report of the Chief of Engineers of the United States Army* (Washington: Government Printing Office, 1893), p. 853.

38. Ibid.

39. *Chatham* (Mass.) *Monitor,* 18 December 1894.

in storage at the Peabody Museum. In white paint on its black topsides it bears the legend:

1861 Ship (Second) "SOOLOO" of SALEM. 784 tons
Gift of Messrs SILSBEE, PICKMAN & ALLEN

It represents a very full-bodied vessel with similar ends, fairly vertical, concave stem, slightly raking rabbet in a vertical post, and some deadrise rounding through moderate bilges into a great deal of tumblehome. Using a device fabricated for the purpose by the late Mr. Sherman Holcomb, a volunteer at the museum, sections were transferred from the one-quarter of an inch to the foot scale model to paper. Taylor carved his model to the inside of plank. Its added stem, keel, and post represent the thickness of the backbone at the rabbet's middle line. This is because the hull's shape is carried to this point, as can be seen in a construction section. Thus pieces of the backbone were heavier on the ship than portrayed on the model where they are decorative as far as their sided dimensions are concerned. I considered their profiles accurate. The obvious discrepancy was at the stemhead. The half-model shows a short projection that in no way demonstrates the billethead and scrolled trailboard at *Sooloo*'s bow. I drew the lines as the half-model was built with no reconstruction whatsoever.

In constructing the full-hull model from the half-model the compilation of a table of offsets was unnecessary. After fairing the lines at the half-hull's scale, lofting to build the model was done photographically. A full-sized negative was made of the lines. Then a print was made to the scale of the new model, three-sixteenths of an inch to the foot.

In *American Lloyds' Registry of American and Foreign Shipping* for 1864 are "Standard Rules for Construction and Classification"[40] of merchant shipping. The engravings and tables therein show the minimum sizes that *Lloyds'* required for a vessel to receive one of its several classifications. The higher the rating, theoretically the better risk the vessel was for the transportation of various goods, hence it paid lower insurance rates. *Sooloo* received, when new, *Lloyds'* highest rating, so she was built at least as strongly as it recommended. *Lloyds'* scantlings formed the basis of *Sooloo*'s frame. But they were modified when I found a construction section drawn by John Taylor for *Panay*.[41]

40. *American Lloyds' Registry*, 1864, pp. xiv-xvii.

41. John Taylor, *Panay* as Built, Plan No. P-382 f1, PMS.

Panay was sixteen years newer and roughly 19 percent larger than *Sooloo*. Taylor's construction of *Panay* was in places up to 14 percent heavier and was nowhere slighter than *Lloyds'* recommendations for a vessel of her 1,190 tons, N.M. *Sooloo* must have followed similar practice for she was built by the same men and for the same trade as *Panay*. I altered *Sooloo*'s type section and scantlings to be as much heavier than *Lloyds'* suggestions for her tonnage as *Panay*'s were for hers. It may be of value to compare *Lloyds'* section with Taylor's in figure 2. Then look at *Sooloo*'s type section in the drawings.

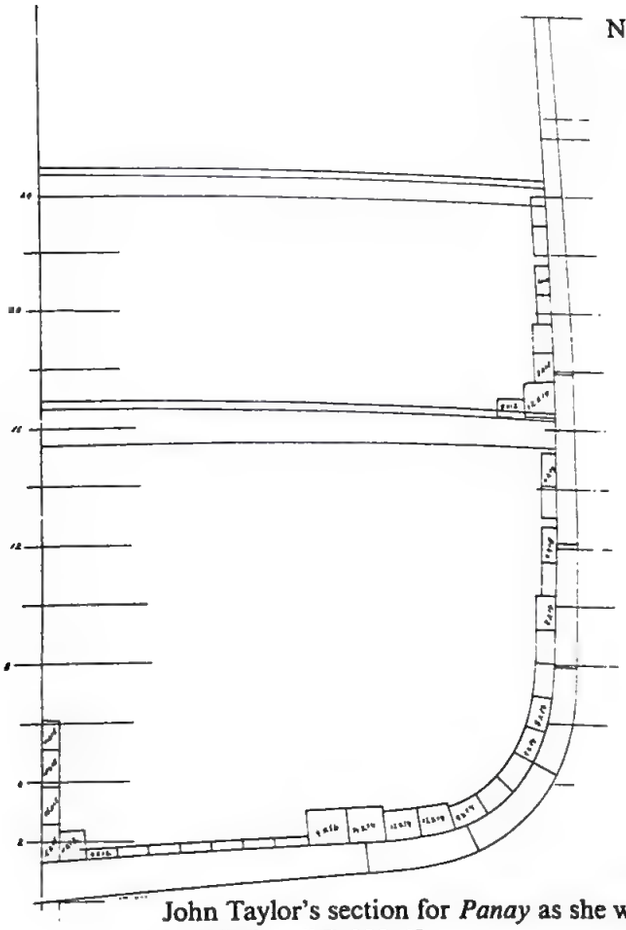
A small but significant item preserved in the Manuscript Collection at the Essex Institute was, regretfully, neither signed, dated, nor paginated: I have dubbed it the Launch Booklet, for it contains the sole reference to *Sooloo*'s date and time of launching. The Launch Booklet was evidently compiled shortly after the ship left on her maiden voyage in 1861. It contains numerous entries valuable to the historian-model builder. It mentions, for instance, that *Sooloo* had a "height . . . between decks [of] 8ft." This is an essential figure for constructing a framed model of a two-decked vessel. Another document found in those files was an itemization of ironwork manufactured by Daniel Stoddard, blacksmith, for Taylor. This lists iron knees and beam stanchions, illustrating that *Sooloo* was more modern than the wooden-kneed and -stanchioned hulls sanctioned by conservative *Lloyds'*.[42] The model's deck beams are therefore supported with cast brass hanging knees. The upper deck beams are bolstered on the centerline with metal stanchions, each with a plate top and bottom.

Taylor's drawing only showed a section; he left no clues for longitudinal spacing of transverse structure. I used *Lloyds'* for this, supplemented by a photograph that revealed timberhead spacing in the bulwarks after the collision with *Messenger*. (See fig. 3.)

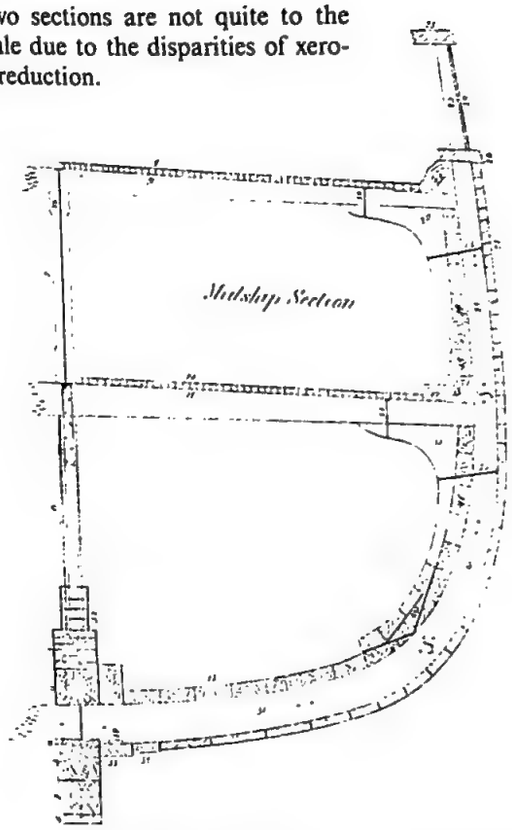
For the hull's exterior I relied heavily on photographs taken by Nathaniel Stebbins. He was a commercial photographer in Boston who specialized in maritime subjects from 1884 until 1922. He made four images of *Sooloo*. Prints of these were obtained from the Peabody Museum and the Society for the Preservation of New England Antiquities. The earlier two,

42. Account of Building Costs Ship *Sooloo*, undated; and Daniel Stoddard, Ship *Sooloo* When Building, Account of Iron Work, undated, both Account Books, SS&P, EI.

N.B. These two sections are not quite to the same scale due to the disparities of xerographic reduction.



John Taylor's section for *Panay* as she was built.
[PMS plan # P-382c1]



Section for a ship of about 800 tons from *American Lloyds' Registry of American and Foreign Shipping*, 1864.

FIG. 2. Comparison of John Taylor's type section for *Panay* and *Lloyds' Register*'s type section for a ship of *Sooloo*'s size and period.

FIG. 3. Showing *Sooloo* at Union Wharf, Boston, about 28 May 1887.
(Courtesy of the Peabody Museum of Salem.)

Stebbins's negatives 819 and 820, show her outbound from Boston for a cargo of Iloilo sugar on her next to last voyage about 4 October 1884 under Capt. W. Frank Powars. She was carrying 27,500 cases of oil. Number 819 has been published in Lubbock's *The Down Easters* and Bunting's *Portrait of a Port: Boston 1852-1914*. It is a port bow view of the ship. The photo was used for determining the scroll on the trail-board, the structure of the boat skids on the forecastle, and the steeve and length of the catheads. A flat bracket on the taffrail's quarter and port running light are clear.

Number 820 was used by G. G. Putnam in *Salem Vessels and Their Voyages*, series 3. He captioned it as having been made when *Sooloo* was outbound on her first voyage 1 June 1861. But Stebbins's own negative dating does not support this. Further, Stebbins was

only about fourteen years old in 1861.[43] Much rigging detail was traceable from this image, which views the ship from a bit ahead of the port beam. Locations of spare spars on the forecastle boat skids and at the port mizzen channel can be seen. Although numbered inversely, this shot was evidently made a few minutes before number 819 as it shows the men hauling down the tack of the forecourse, which is set in the photo described above.

The second pair, Stebbins's negatives 558 and 1293, was made about three years later in 1887 when *Sooloo* returned from her twentieth cruise. These illustrate the damage sustained in the collision with *Messenger* and the jury rig which brought her into Vineyard Haven. They were of little use for figuring rigging arrangements above the lower masts. Number 558, also published in Bunting, shows her under tow by Boston Tow-Boat's *Wm Sprague* and another unidentified tug, on 28 May, six days after the collision. The view is from the port quarter and looks down onto the deck from about the height of the tops. Inboard, the proximity of the capstan to the after end of the anchor deck can be seen through the smoke from the tug at the port bow. The absence of pinrails and pump flywheels is clear. There is a decorative star on the heel of the spare topmast. It is good to see that the jury rig included an ensign staff.

The last of the four, number 1293, shows *Sooloo* from the starboard bow. She is fast to Union Wharf in Boston about 28 May 1887. (See fig. 3.) The collision started planking from the bulwarks at the fore channels. This revealed spacing of timber heads inside. The forecastle access ladder can be seen through a break in the bulwarks. Also visible inboard is the carving on the bracket under the fore portion of the coach house roof and a smashed boat. Outboard, ironwork on the bowsprit is discernable as are many other details on the topsides. Careful viewing disclosed the pattern of the nailheads holding the copper to the hull.

Although varying in clarity, each of these four images captured by the prolific Stebbins was of enormous value in reconstructing *Sooloo*. I became accustomed to these four photographs. During the early stages of building the model they revealed countless features. After months working on the model I felt like the loupe had grown into my right eye socket. I learned a great deal about letting myself see what was there, rather than what I wanted to think was there. Although they are expensive I cannot overstate the importance of studying photographic prints themselves. Images half-toned for reproduction in books suffer tremendous loss of resolution. Magnification of them with a loupe reveals only the half-tone dots, not details in the prototype. With practice I found I could reconstruct things from the photographs that I could not see directly in them, if I could see their shadows. Also I learned to read shadows within shadows.

These abilities became increasingly vital as I labored on *Sooloo*'s inboard works. The basic arrangement was easy to plot, but then began a long season of working out dimensions through proportions. I was grateful for the Launch Booklet. It told me, for instance, the size of the boats on the skids, as well as the wire sizes and length of the anchor and various other chains. It also reported the presence of features simply not visible in the photographs, but which would add texture to the model. The brass stair treads for the anchor and quarterdeck accommodation ladders are an example.

Sooloo's deck arrangement was confirmed by two paintings of her. The more useful was an action-packed watercolor by George F. Gregory, an Australian. It is shown in figure 4. The signed painting is dated 1876.[44] It was presumably made between October and December of that year when *Sooloo* was in Melbourne under Captain Allen during her thirteenth voyage. Gregory shows her beating to weather on the starboard tack. She is heeling sharply to port and a large wave is breaking over the starboard bow. The artist seemed to scale the vessel and her crew realistically.

The second painting is signed by the Chinese ship portraitist Lai Sung.[45] Although undated, the piece was probably done in 1863, 1866, or 1871 when *Sooloo* was in Hong Kong. It shows the ship posed more formally. In the background are a western vessel, a junk, and a rocky islet. The ship is upright and has a starchy look which seems typical of the Chinese portraits. Disproportionately long and fine spars on a hull manned by men far too small give the impression of a ship larger and more graceful than *Sooloo*. Perhaps this was to

43. W. H. Bunting, *Steamers, Schooners, Cutters, and Sloops* (Boston: Houghton Mifflin Co., for the Society for the Preservation of New England Antiquities, 1974), p. 6.

44. George F. Gregory, *Sooloo*, Signed Watercolor Painting, dated 1876 (PMS #M12457), PMS.

45. Lai Sung, *Sooloo*, Signed Oil Painting, undated (PMS #M5553), PMS.

FIG. 4. *Sooloo* as portrayed by the Australian George F. Gregory. (Courtesy of the Peabody Museum of Salem.)

flatter her captain or owners. Nonetheless, the piece does support evidence for the deck's arrangement.

Whereas the paintings were useful for information on a large scale, they helped little in the realm of small detail. For this I relied on photographs. When I could not squeeze what I required from those of *Sooloo* I turned to those of other vessels. First I tried *Panay*. Stebbins made a few images of her. They were useful. I referred to the plentiful photographs of *Benj. F. Packard*[46] for such items as the freshwater pump on the main fife rail and the shape of the hatch coamings. A visit to the *C. A. Thayer* in San Francisco helped with details. These included the fitting of the large cavels inside the bulwarks and the little scuppers in the edges of the anchor and quarterdecks and the two deckhouse roofs.

Examination of this schooner helped me to see the Stebbins photographs with an even freer eye. For instance, I had been ready to build the coach house on the model with a heavy coaming on the quarterdeck like the main deck's hatch coamings. On the *C. A. Thayer* no coaming was present. There was only a relatively light timber sill where the house side met the deck. Careful review of the photos disclosed a similar fitment in *Sooloo*.

Although surprised that Taylor would have omitted them because of the strength they would have added to the bulwarks, *Sooloo* was not equipped with pinrails. The belaying pins were set directly into the main rail.

Interesting challenges arose regarding *Sooloo*'s deck equipment. These focused on three areas of machinery: the capstan-windlass, the bilge pumps, and the helm.

Close scrutiny of the anchor deck, where it is visible in Stebbins's pictures, reveals that the capstan was fitted perilously, perhaps almost inoperatively, close to the aft end of the raised deck. I cannot accept that Taylor built the vessel this way: it meant men would have been unable to walk a full circuit around the capstan. I

46. W. S. Quincy, *Ship Benj. F. Packard* (Mystic, Conn.: Mystic Seaport Inc., 1977), pp. 4-22; and Andrew W. German, "The *Benj. F. Packard*, 1883-1983." *The Log of Mystic Seaport* 35 (Fall 1983): 100, 101.

suspect the ship was probably built with the older wooden-barreled, pump-brake style of windlass. It was mounted between heavy bitts on the main deck. It was connected by linkages to its pump-brake drive on the anchor deck above. An entirely separate capstan was mounted forward of the windlass's pawl post. The cyclone in Calcutta bent the original windlass shaft, making its operation difficult.[47] This may not have led directly to the replacement of the gear, but the old-style windlasses were slow to operate and required many men. By the late 1870s and early 1880s the crunch for able seamen was being felt, and most vessels sailed short-handed. Any equipment making things easier, faster, and more economical would be utilized. Thus, when *Sooloo*'s original windlass and separate capstan became inoperable they were replaced with a modern combination capstan-windlass.

The capstan-windlass was an improvement over the earlier pump-brake style because it allowed the windlass to be driven in a continuous motion. The windlass portion was mounted on the main deck and was connected, via bevel gears on a vertical shaft, to the capstan directly above on the anchor deck. Men walked around the capstan and their effort was transferred smoothly to the windlass below. The mechanism was geared to give both the windlass and capstan portions multiple speeds. Also, the capstan could be used independently if desired. Another improvement was the fitting of chain wildcats to the windlass barrel. These allowed chain anchor cables to be hauled in directly without the necessity of stopping every few revolutions when, as with the older style, the hawse crept along the horizontal barrel to the end and jammed.

Capstan-windlasses were being built by companies such as the Hyde Windlass Company of Bath, Maine, who held the first patents for this sort of equipment in the United States, and the American Windlass Company in Providence, Rhode Island. These firms produced similar products, judging from their catalogs.[48] The capstan-windlass that I built for *Sooloo* is a composite of both.

I initially assumed *Sooloo* was fitted with the flywheel pumps commonly observed in mid-nineteenth-century American merchant sailing vessels. But, at the last, I could justify no evidence of these on her main fife rails, where they were normally installed. Indicators displayed consistently that *Sooloo* was provided with more modern gear. She must have carried new and powerful iron piston-type pumps. These could be operated independently of each other for they did not utilize a common crankshaft. Further, their use was measured in strokes rather than revolutions. *Sooloo*'s log supports this.[49]

Finally, the steering gear was an interesting project. Its simplicity was revealed by studying the photograph of *Sooloo* under tow and a Stebbins photograph of *Panay* made in 1887.[50] The forward bearing of the wheel's shaft was centered on the top of the rudder shaft. The bearing allowed the rudder to turn on a vertical axis and the wheel to turn on a horizontal axis. The wheel turned the rudder via tiller ropes which ran between a drum on the wheel's shaft and an iron tiller abaft the rudder shaft. Important to this system is the fact that the rudder's turning axis was perpendicular to the wheel's. In this case, the rudder's was vertical and the wheel's horizontal.

Sooloo's rig was fairly standard for her day, as can be seen. Only one contemporary plan for her has surfaced. It is a spar and rigging plan dated October 1877. Its unidentified draftsman included some spar lengths and the dimensions of the tops and topmast crosstrees. Although apparently rough and unfinished, the dimensions on the drawing checked against a scale. But the chief information culled from it was the masts' rake and bowsprit's steeve.[51] The Launch Booklet once again came to the fore. Thank heavens its compiler recorded all *Sooloo*'s spar dimensions. (See table 4.) Note the fore and main lower topsail yardarms are shorter than corresponding upper topsail yardarms. This is because the lower topsails did not reef, thus their yards' arms did not have to be long enough to accommodate reef tackles. All the fore and main spars are identical except for the lower masts. This was convenient for the ship's carpenter and model builder alike. Despite the great value of this table, it regretfully contains no entries for the spencer mast at the mizzen, or the diameter of gaffs or spanker boom.

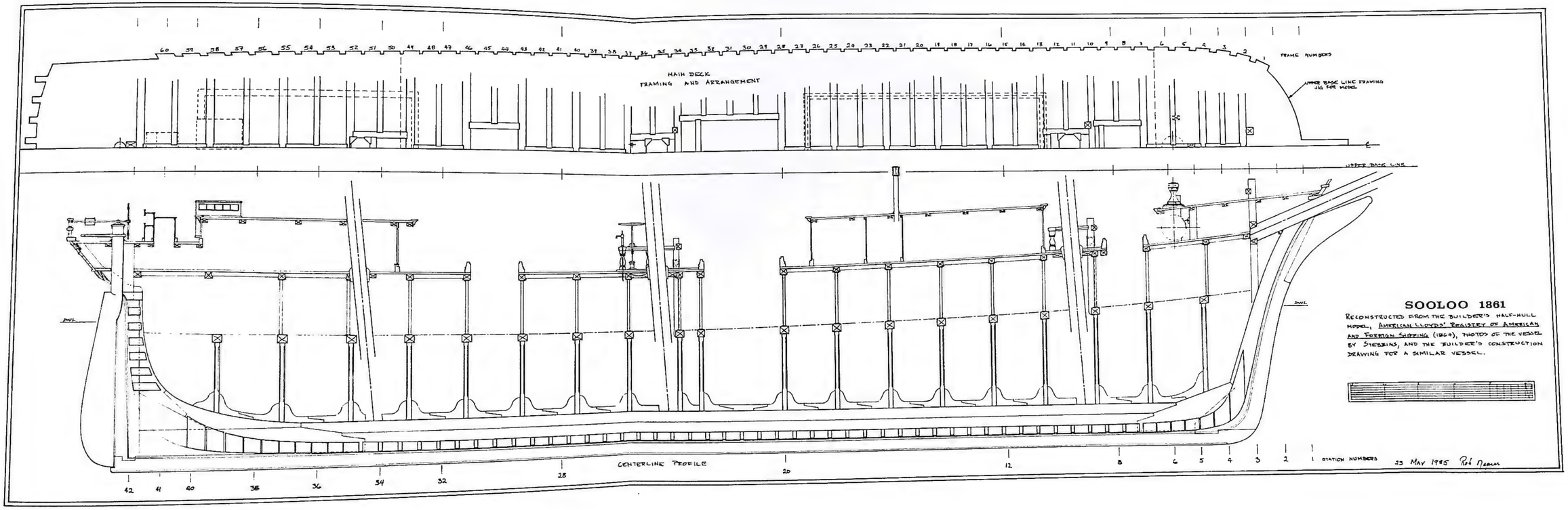
47. Beadle, Journal, entry dated 12 October 1864.

48. Hyde Windlass Company, Catalog (Bath, Maine: Hyde Windlass Company, 1902), pp. 14, 15; and American Ship Windlass Company, Catalog (Providence, R.I.: American Ship Windlass Company, 1897), pp. 10, 11.

49. Beadle, Journal, entry dated 15 August 1866.

50. W. H. Bunting, *Portrait of a Port: Boston, 1852-1914* (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1971), p. 347.

51. Ship *Sooloo* October 1877, Scale 1/8, Spar/Rigging Plan, Plan # 1133, PMS.



SOOLOO 1861

RECONSTRUCTED FROM THE BUILDER'S HALF-HULL MODEL, AMERICAN LLOYDS' REGISTRY OF AMERICAN AND FOREIGN SHIPPING (1864), PHOTOS OF THE VESSEL BY STEBBINS, AND THE BUILDER'S CONSTRUCTION DRAWING FOR A SIMILAR VESSEL.

23 MAY 1985 Rob Neaum

Table 4

SPAR DIMENSIONS

Masts	*Length*	*Head*	*Diameter*
Main Mast	70 ft. 3 in.	12 ft.	29. in.
Fore Mast	67 ft. 9 in.	12 ft.	28. in.
Fore and Main Topmasts	39 ft. 6 in.	7 ft.	15. in.
Fore and Main Topgallant Masts	20 ft.		10. in.
Fore and Main Royal Masts (unfidded)	13 ft.		
Fore and Main Poles	8 ft.		
Mizzen Mast	64 ft.	10 ft.	22. in.
Mizzen Topmast	31 ft. 6 in.	6 ft.	12. in.
Mizzen Topgallant Mast	15 ft. 6 in.		7.75 in.
Mizzen Royal Mast (unfidded)	10 ft.		
Mizzen Pole	6 ft.		

Yards	*Length*	*Arms*	*Diameter*
Fore and Main Yards	64 ft. 6 in.	2 ft.	16.5 in.
Fore and Main Lower Topsail Yards	56 ft.	1 ft. 6 in.	13.5 in.
Fore and Main Upper Topsail Yards	48 ft.	2 ft.	12.5 in.
Fore and Main Topgallant Yards	37 ft. 6 in.	1 ft. 6 in.	9.75 in.
Fore and Main Royal Yards	29 ft. 6 in.	10 in.	7. in.
Cross Jack Yard	52 ft.	2 ft.	14. in.
Mizzen Lower Topsail Yard	45 ft.	1 ft. 6 in.	10.75 in.
Mizzen Upper Topsail Yard	38 ft.	1 ft. 6 in.	9.75 in.
Mizzen Topgallant Yard	28 ft.	1 ft.	7.25 in.
Mizzen Royal Yard	21 ft. 6 in.	10 in.	5. in.

Other Spars	*Length*	*End*	*Diameter*
Bowsprit outboard	21 ft.		27. in.
Jib Boom outboard to first stop	14 ft.		15. in.
to second stop	12 ft.	5 ft.	
Spanker Boom	44 ft.	2 ft.	
Spanker Gaff	35 ft.	5 ft.	
Spencer Gaff	18 ft.	2 ft.	

Source: Account of Building Costs Ship *Sooloo*, undated, Account Books, SS&P, EI.

Further along in the Launch Booklet is a notation that John Taylor was reimbursed $120.00 for spars and ironwork needed to fit Howes' Rig. Examination of Silsbee, Pickman and Allen files unearthed a receipt for $78.40 (at ten cents per ton) paid to Capt. Frederic Howes of Yarmouth, Massachusetts, so they would have rights to his invention recorded in a 20 June 1854 patent. This was for an "extra yard to topsails" and the gear necessary to support what became known as the lower topsail yard at the lower mast's cap. The patent itself makes no mention that the upper topsail's foot was to be secured along its length to the lower topsail yard, or that the yard was laced to the middle of a single topsail. It only provides for the presence of the yard and a support system for it, as can be seen in figure 5.[52] It speaks for Silsbee and Pickman's honest reputation that Captain Howes was paid for this. I cannot believe that he received stipends from all the thousands of vessels equipped with gear adhering to the sweeping description in his patent.

52. Captain Howes' Receipt, 5 June 1861, Account Books, SS&P, EI; and M. D. Leggett, comp., *Subject Matter Index of Patents for Inventions Issued by the United States Patent Office from 1790 to 1873, Inclusive* (Washington: Government Printing Office, 1874), p. 1238.

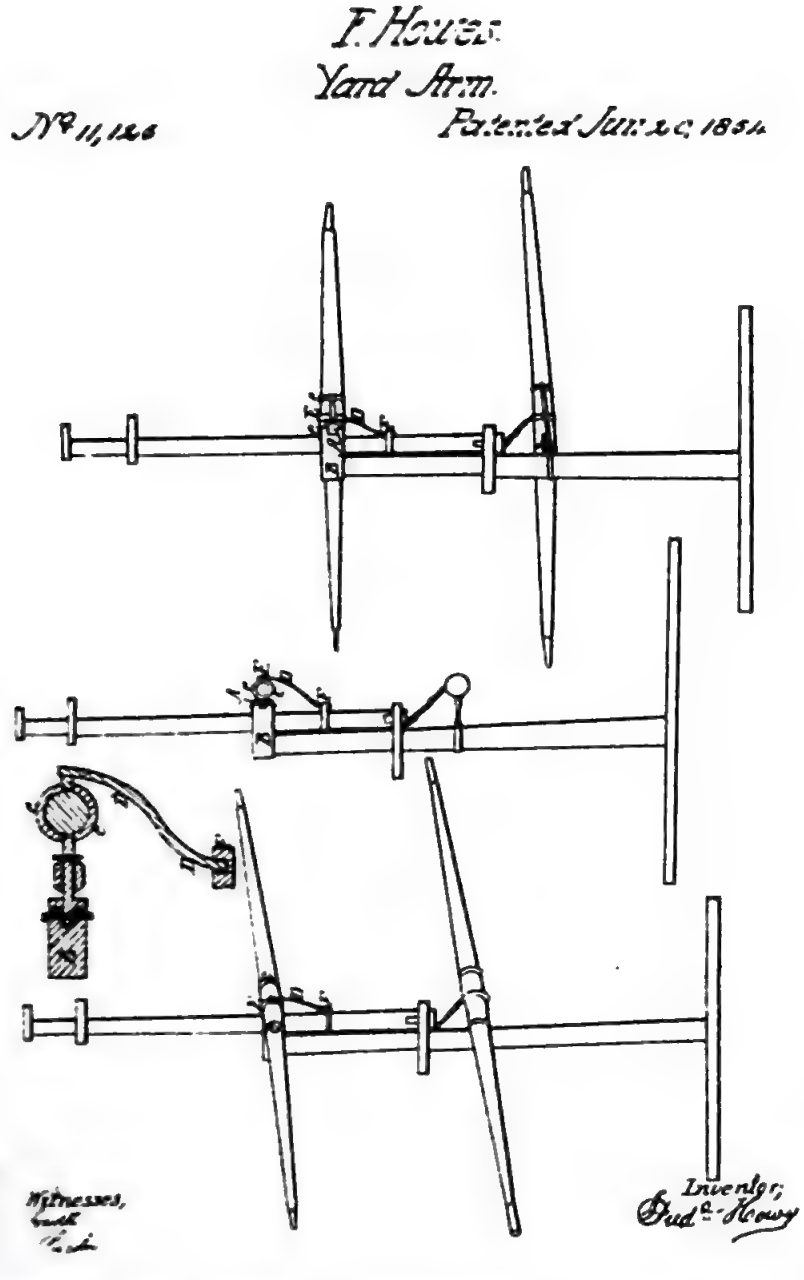


FIG. 5. The drawing accompanying the patent for Howes' Patent Topsail Rig. From *Subject Matter Index of Patents for Inventions Issued by the United States Patent Office from 1790 to 1873.*

Sooloo's logs revealed the use of studdingsails on the ship during her earlier voyages. Equipment for them can be seen in the photograph of the ship in Calcutta in 1864. (Refer to fig. 1.) This photo reveals the great tumblehome in *Sooloo*'s hull, and awnings spread over the deck for shade can be seen. But by the time she was photographed by Stebbins in the eighties, there was no longer any trace of them. The model was built to portray the ship as she appeared in the mid-1880s, so I did not include this equipment.

Determining the actual detailing of the rigging was straightforward. The leads of both standing and running lines were taken from the Stebbins photographs with almost everything being quite clear except the leads of some braces. The leads of many lines could be traced by holding a photograph at eye level thus foreshortening a line's length. This makes it reasonably manageable to see where an individual line goes in the maze of rigging. *Lloyds'* listed minimum sizes for rigging.[53] This list was studied and compared to the pictures. A lot of extrapolating was done. I had to take into account the visual distortion of lines' sizes in photographs due to silhouetting against contrasting backgrounds.

The paintings by George F. Gregory and Lai Sung came into their own as reference sources for determining *Sooloo*'s color scheme. Gregory's watercolor was the more useful of the two. I ascertained that pigments in the piece had probably not changed much since 1876. It was surprising to see how much color there was around the ship. Long study of black-and-white photographs tends to give the impression that the nineteenth century was a black-and-white world. Photos were not of much value for deciphering colors themselves, as may be suspected. They did, however, disclose more specifically than the paintings where colors began and ended. For instance, one shows quite clearly that the top of the topgallant rail is black everywhere except under the stanchioned taffrail along the quarterdeck. The photos also revealed the different finishes used on the scrolls and lettering at bow and stern. Bright reflections of light off the scrolls indicated gilding whereas the lettering of name and hail had a flatter finish indicating paint was used on the vessel.

For all the countless references to maintenance of the vessel's finish in logs and journals, there were very few to the actual colors used when repainting things. One of Charles Beadle's journals mentioned that the men painted the interior of the bulwarks with nothing more specific than a "bad color." In another place he mentioned that "they painted the waterways and around the Combings blue."[54]

An extensive receipt from Tenney & Co., a chandler at Central Wharf in Boston, dated 29 May 1861 listed, among hundreds of other items, pigments purchased by *Sooloo* when she was new. These colors were white, black, verdigris, chrome yellow, red, and Prussian blue.[55] The amounts of each pigment purchased helped

53. *American Lloyds' Registry*, 1864, pp. xxiv, xxv.

54. Beadle, Journal, entries dated 10 March 1866 and 25 January 1867.

55. Tenney & Co. Invoice, 29 May 1861, Account Books, SS&P, EI.

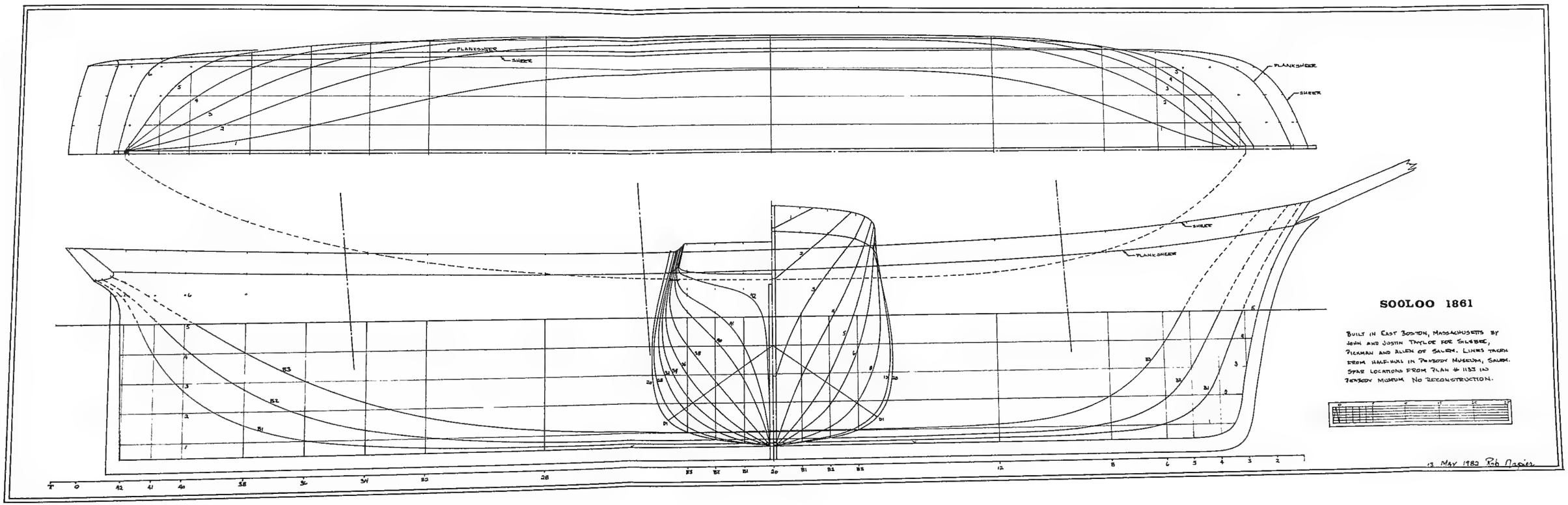

PLANKSHEER
SHEER
SOOLOO 1861
BUILT IN EAST BOSTON, MASSACHUSETTS BY JOHN AND JUSTIN TAYLOR FOR SILSBEE, PICKMAN AND ALLEN OF SALEM. LINES TAKEN FROM HALF-HULL IN PEABODY MUSEUM, SALEM. SPAR LOCATIONS FROM PLAN # 1133 IN PEABODY MUSEUM NO RECONSTRUCTION.
13 MAY 1982 Rob Napier

Table 5

Sooloo's Color Scheme

Color	*(Source) Item*
Black	(Gregory painting) Hull exterior above waterline; channels; boomkins; trailboards; anchor deck lifelines; bowsprit; martingale; bowsprit shroud and bobstay backing plates; most mast ironwork above lower caps; yardarms; gaff and boom ends. (Stebbins's photographs) Running light screens; quarter braces on taffrail; galley smokehead; all mast doublings; jibboom inside cap.
White	(Gregory) Forecastle; coach house; boats; taffrail. (Stebbins) Interior of bulwarks; inboard portions of catheads; top of topgallant rail under taffrail; top of bitts on anchor deck; fife rails; boat skids; skylight-binnacle; lifelines on coach house; lower masts; tops; liferings.
Red	(Gregory) Hawse lips; mooring fairleads; anchor stock banding; all banding and chain on bowsprit and cap; lower deadeye strops, chain plates and backing links; all banding on masts from lower caps down; lower mast futtock shrouds; topmast shroud bullseye strops; topmast futtock bands; lower and topsail yard cranes, trusses and slings; all chain portions of tyes and halyards.
Red-brown	(Gregory) Center portions of taffrail stanchions; boats' sheer strakes; course and toprail brace blocks.
Bright Oiled	(Gregory) Anchor stock. (Beadle's Journal) Anchor deck; main deck; all spars except lower masts, bowsprit and jibboom inside cap.
Bright Varnish	(Stebbins) Wheel; trim on skylight/binnacle. (Beadle) Quarterdeck; tops of forecastle and coach house.
Blue	(Beadle) Waterways and hatch coamings.
Yellow	(Stebbins) Names, hail and quarterboards.
Gold	(Stebbins) Scrolls at bow and stern.

to determine how much of each might have been applied around the ship. Table 5 summarizes the model's color scheme and sources for it.

Four of the many photographs I made when the model was complete were carefully composed to mimic the angles in Stebbins's originals. Figure 6 was made to correspond to Stebbins's negative number 820. In order to compensate for the heel of the ship I placed my camera at different heights above the model. To reduce perspective distortion I used a telephoto lens and made exposures from about twenty feet away. The photographs of the model could then be compared to those of the ship to see how well the former was scaled and proportioned. Although *Sooloo*'s model was finished, this procedure would help with model-building projects in the future.

A major intent of this project was the investigation of possibilities for doing thorough research on a particular vessel which had heretofore not been popularized. I was fortunate in my choice of subject, for a tremendous amount of data concerning *Sooloo,* her builders, owners, masters, and trade survives. What did not exist, however, was a three-dimensional portrait of this deserving and long-lived workhorse: an accurate, full-hull, rigged scale model. I endeavored to build such a model and have it stand as a result of the research.

I am indebted to *Sooloo*'s owners and crews and their descendants for making and preserving records of her career. I am extremely grateful to the staffs of the Peabody Museum and Essex Institute, both in Salem, Massachusetts, for extending access to models, paintings, and documents for study.

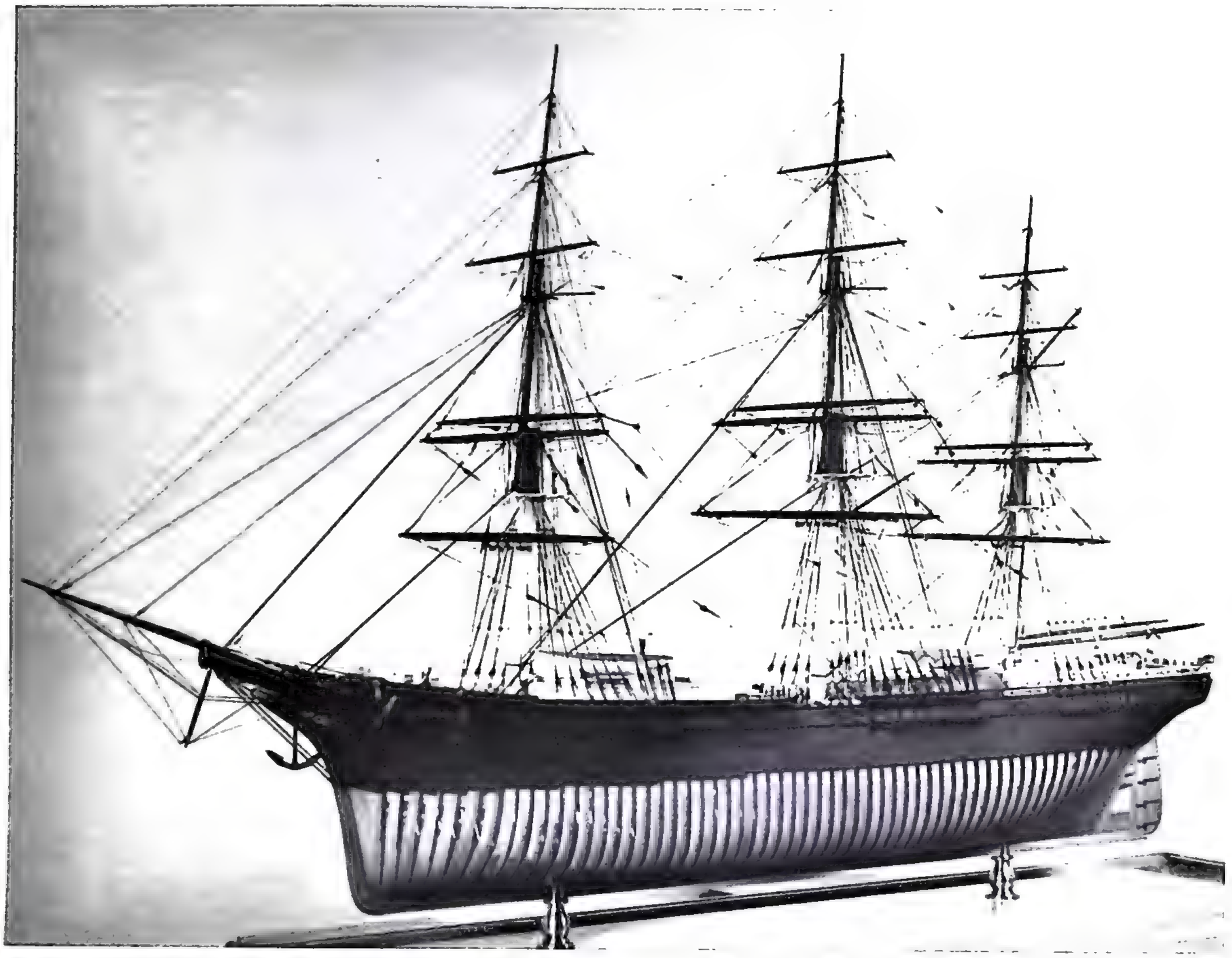


FIG. 6. The author's model of *Sooloo*. The bottom of the topside planking shows the ship's average draft. (Photograph by the author.)

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Rob Napier is a ship model builder and marine historian living in Newburyport, Massachusetts. He builds, repairs, and writes about ship models; his work may be found in private, corporate, and museum collections in this country and abroad. His model of Sooloo *earned a Gold Medal in the 1985 Scale Ship Model Competition at the Mariners' Museum in Newport News, Virginia.*

Books Received

CHARLES B. ARTHUR, *The Remaking of the English Navy by Admiral St. Vincent—Key to the Victory Over Napoleon: The Great Unclaimed Naval Revolution (1795-1805)* (New York, N.Y.: University Press of America, Inc., 1986), 8½" x 5½", 265 pages, notes, bibliography, $13.75, paperback; $25.50, hardback.

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EMILY CAIN, *Ghost Ships—Hamilton and Scourge: Historical Treasures from the War of 1812* (New York, N.Y.: Beaufort Books, 1983). 10¾" x 8½", 152 pages, illustrations, notes and index. (No price given), hardback.

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DAVID WALKER, *Champion of Sail: R. W. Leyland and his Shipping Line* (London, Eng.: Conway Maritime Press, 1986). 10¼" x 7¾", 191 pages, 150 illustrations, appendices, notes, bibliography and index. (No price given), hardback.

RICHARD E. WINSLOW, III, *Portsmouth-Built Submarines of the Portsmouth Naval Shipyard* (Portsmouth, N.H.: Portsmouth Marine Society, 1985). 10¼" x 7¼", 221 pages, illustrations, appendix, notes, bibliography and index. $19.95, hardback.

Raleigh in Exeter 1985: Privateering and Colonisation in the Reign of Elizabeth I (Papers delivered at a conference at Exeter University on 3-4 May 1985 to mark the four-hundredth anniversary of the first attempt to settle English people in North America), edited by Joyce Youings (Exeter, Eng.: University of Exeter, 1985). 8¼" x 5¾", 117 pages, 8 plates and notes. (No price given), paperback.

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Book Reviews

HARVEY ARDMAN, *Normandie: Her Life and Times* (New York: Franklin Watts, 1985). 6″ x 9¼″, cloth, iv + 427 pages, 36 illustrations in black and white and index. $22.95.

When *Normandie* passed Nantucket Lightship on her fourth eastbound crossing an officer shot a bird that had been following the liner. His prize was an eagle, and he displayed it later in Normandie's grand salon. Fanciers of the *post hoc* fallacy certainly could note omens in this detail that *Normandie: Her Life and Times* provides, especially in chapters about the liner's 1939-1947 fate in the hands of Americans.

Normandie in her looks, size, hull design, appointments and fate consistently fascinates and embarrasses pre-babyboom Americans. Many books have devoted chapter-length attentions to her design, service life, fire and salvage, all of them affectionate treatments meant for the general reader. *Normandie: Her Life and Times* follows that tradition with good detail and up-to-date interview data.

Certainly the book is a well-crafted rendition of the liner's career, and it especially succeeds at presenting complex technical data without patronizing the general reader, notably with the launch and vibration problems. The description of the origins of the fire, the Gilbert and Sullivan jockeyings of the U.S. Army and Navy in the liner's story, the liner's capsize and salvage are especially satisfying.

It's also a surreal tale. *Normandie,* in her vastness and luxury, hyper-*chic* in an era of depression, inward-looking nationalism, war-rumblings, grotesquely mirrored the mentality of the French Third Republic. The scenes of a French president's wife ceremoniously offering five hundred dollars to the poor of New York at a Versailles-style maiden voyage reception, not to mention that of a fashion designer assuring reporters that the women of France can avert war by clothes and the stylish wearing of them are fascinating, unsettling. They could parallel that of an earlier French notable who sincerely endorsed cake.

The depictions of the liner's designer, Vladimir Yourkevitch, and his American counterpart, William Francis Gibbs, are well done, particularly in the moral worts that Ardman adds to their portraits. Gibbs felt that the meek would inherit the earth if they were nimble. This book acquits these men as surpassingly nimble, though hardly meek. Yourkevitch, even before *Normandie* was launched, worked several sides of the street to promote himself and his theories of hull design with the French Line's British, German and American competitors. Gibbs outdid Yourkevitch in the *America* contract; after the *Normandie* fire, he pulled technical and bureaucratic strings to get the contract for converting the liner to military uses, and with dazzling persistence and wrongheadedness. Minds in the Navy's reality zone overruled Gibbs, but not for long: in 1952 he saw the launch of *United States*, a technical marvel as a liner-potential troopship that turned out to be commercially unprofitable and a strategic white elephant.

The descriptions of the liner's furnishings and works of art are intense, though Ardman seems too effusively committed to the glories of Art Deco. He also falls into a hoary convention of books about 1900-1950 liners, that of noting prominent passengers per crossing. One wonders if any reader under thirty would care about their corporations, offices and starring roles. Possibly they think it square decadence. The book's narration is interjected with historical reminders in a meanwhile-in-Hitler's-circles style that seems simplistic and intrusive.

The unhappiest problem with this book is its writing style and editing. The book seems the product of two minds. In the opening and closing chapters the first mind wants to sound like a writer, and the results are annoying and embarrassing. There are odd, strained analogies (the launch crowd was as ghoulish as the spectators at the Indianapolis 500), maddening patches of alliteration and assonance (. . . gray day in the depths of the darkest depression . . . clanging and banging . . . gradually faded away . . . plucking hull plates from the building-berth floor . . .). There are numerous trite passages and archaisms, at least for 1985.

The other mind seems to be that of a reporter who offers a competent, objective story backed up with extensive, thoughtful analysis of interview data. More scrupulous editing might have brought those minds closer together.

Ardman maintains that *Normandie* is still with Americans in her post-1947 recycled steel that comprises cars, appliances. She's also still with us in the auction houses with her appointments and works of art commanding ever higher prices. Also, her mystique and its spirit of excess pervade the publishing industry. As of this writing, the liner moves, inevitably, into coffee-table book territory with the imminent publication of *Normandie: Queen of the Seas*, a multi-authored book marketed by Vendome Press at fifty dollars a copy.

JOHN CHRISTIE

Indiana State University
Terre Haute, Indiana

bernard cadoret, dominique duviard, jacques guillet, henry kérisit, françois vivier, *AR VAG* (Le Chasse-Maree, Abri du Marin -B.P. 159 29171 Douarnenez Cedex, France). 9″ x 12″, hard cover, 446 pages, many illustrations.

AR VAG is a great book, great in more ways than one. It weighs more than four and a half pounds, its outside dimensions are better than nine inches by a foot, and is an inch and three quarters thick with nearly 450 pages. Five authors are listed, their names all in lower case, and an additional four collaborators.

This, the third book in a series, is the story of the small working sailing craft that once crowded the Atlantic waters of the French Brittany coast. Commencing with a history of the local craft, really the evolution of the type, the book describes the eighteenth-century "Bateau breton" with its two-mast rig, and goes on to tell of the many different rigs down through the years, ending up with the last of sail, the gaff-rigged sloops and ketches, even into the age of diesel power. Although the area covered by the book does not extend many miles along the coast, there are many trades, and the authors well describe the individual roles taken by the different types of vessels. Fishing was a way of life for many; their story is told. Then there were craft that hauled sand or gravel, or barrels or seaweed; each has its place.

Certainly the highlight of the book is the perfectly wonderful illustrations. The photographs, the prints, the terrific pen-and-ink work, the drafts and plans, all so well reproduced and in such profusion, seldom a page without at least one picture, often two pictures to a page. Many of the older views have come from postcards of the day, enlarged yet sharp and clear.

Although text and captions are in French, a reader with but a high school knowledge of the language plus a French-English dictionary should have no trouble getting the gist of the book. As for the pictures, they practically speak for themselves. A good road map with Brest in the center would help the reader to follow the text and aid in tying in with the charts in the book.

GILES M. S. TOD

Hingham, Massachusetts

WILLIAM A. BAKER, *The Lore of Sail* (New York: Facts on File Publications, 1983). 4½″ x 7½″, paper, 256 pages, illustrations, introduction index. $5.95.

During the late 1960s William A. Baker and a team of co-authors working with Swedish publishers brought out a series of large format books whose titles began with the phrase "The Lore of. . . ." These volumes were intended to describe the technical workings of trains, ships, airplanes and cars in a clear and workmanlike manner for the interested layman. Although the prototypes and examples cited were primarily of European origins, the books enjoyed wide distribution in America and were common items on bargain tables for many years.

The work currently under review is really a downsized paperback reprint of one of this series. There is some text but the main emphasis is on the illustrations which are numerous, highly detailed and number-keyed. The drawings of fittings, mast components, sail and rigging plans, hull forms, and tools are somewhat stylized rather than photographic in their rendering but that does not detract from their clarity and accuracy. In a few instances European nomenclature is evident and there is an occasional misperception. For instance on page 82 it is claimed that the Baltimore

clipper is considered to be the forerunner of the Classic clipper ship. Most American authorities agree with Howard I. Chapelle that the two types had little in common except their names and a generalized quest for speed under sail. Another quibble that could be registered is that the drawings of ship and boat types in chapter 3 are very rudimentary and unenlightening; nevertheless, this is a practical and interesting little handbook that nautical buffs and model makers can keep on their shelves for quick reference and perhaps working the occasional maritime crossword puzzle.

JAMES E. VALLE

Delaware State College

CAPT. THOMAS MINTO and ERIC STEVENS, *The Search for the Kobenhaven* (5 Kent St., Epping, N.S.W. 2121: Graeme K. Andrews Productions, 1984). Paper, 52 pages, illustrations. $5.00.

The real significance of this booklet lies not in the title story, which deals with the futile efforts to learn the circumstances of the disappearance of a famous square-rigged training ship, but in the totality of the publication which, in three true sea yarns, depicts graphically, accurately and sometimes humorously, how it was to be a merchant mariner during the Great Depression (1930-1936).

In the opinion of this reviewer, the publisher has done a real service to maritime history in bringing to print, even in so limited an edition of 1,000 copies, the well-written voyage accounts of two Australians: one an officer in steamers of the Adelaide Steamship Company, the other a twenty-five-year-old sometime clerk and farm worker who signed on the crew of the Finnish sailing vessel *Parma* for her 1936 voyage to the U.K.; as it turned out, her last voyage.

The toll of the Great Depression on ships and seamen the world over has received little attention in the literature of the sea. Captain Minto, in his accounts of the search for the *Kobenhaven* which went mysteriously missing in late 1928 and the rescue of the S.S. *Milluna* which broke her tailshaft at sea in mid-1932, provides the reader a new understanding of hard times and their impact on ship operation and the lives of mariners. His stories, both based on carefully-kept journals, make for enjoyable and absorbing reading quite apart from their historical value.

Eric Stevens' contribution is in the form of a letter/diary kept for his mother, covering the *Parma*'s 117-day passage to Falmouth by way of the Cape of Good Hope. He was a first-voyager who was seasick for the first two weeks at sea. Still, he observed rather well and reports his observations in interesting fashion. On arrival at Falmouth he wrote: "I see there's not much happened in the world since I left Spencer's Gulf except that Italy beat Abyssinia, Communism rules in Spain, and Perry won at Wimbledon for the third year in succession. . . . It will be really good to return to civilization and live and eat properly again. But there are parts of the trip that I've enjoyed and I'd never regret having done it—ever."

Indeed, the reader will never regret having devoted time to this attractive booklet.

CHARLES S. MORGAN

Concord, Massachusetts

MARTIN GILBERT, *Winston S. Churchill: Finest Hour 1939-1941* (Boston: Houghton Mifflin Company, 1983). 6" x 9¼", cloth, xx + 1,308 pages, 43 illustrations, 22 maps, footnotes and index. $40.00.

At eleven o'clock on 3 September 1939, Great Britain declared war on Nazi Germany. After the mauling of Poland, the war settled down to what journalists dubbed the "phoney war" and appeared no worse than a wet hens' squabble in the European community. By 12 December 1941 (the time span of this book), the entire planet was in arms and civilization in the balance.

Finest Hour is the sixth volume of the official biography of Sir Winston Churchill. It begins with Churchill's return to the Admiralty as First Lord and closes with an excellent account of the decisions leading to the fatal deployment of *Repulse* and *Prince of Wales* at Singapore. Between those two points, the book carefully relates Churchill's influence on the deployment of British seapower and the Cabinet's considerations in the chosen courses of action. The work is complete in itself and although reading the earlier tomes is a rewarding task, it is unnecessary for enjoying *Finest Hour*.

The book is divided into four parts: "At the Admiralty," "'Darkest Hour,'" "Britain Alone," and "World War." The first part chronicles the events leading to Chamberlain's fall and Churchill's assumption of the Premiership. This was the time of Churchill's second term as First Lord of the Admiralty, and though he turned sixty-five during this time, his interests and energies would have exhausted men a third his age. Before the war was three weeks old, Churchill was bombarding the naval staff and Cabinet ministers with ideas on the construction of decoy warships for Scapa Flow, deploying monitors in the Rhine River, ordering the installation of radar on RN ships (none of which carried radar prior to his order), ferreting out great quantities of artillery he ordered stored away after the last world war, and the possibility of sending a squadron of specially prepared battleships into the Baltic Sea. This is by no means a complete list of Churchill's concerns at that time but it does give some notion of the depth and vigor of his mind. It also strengthens this reviewer's suspicion that genius is far easier to admire from afar than to work with in close quarters.

The remainder of the book might aptly, if irreverently, be titled "The Wooing of America." Churchill knew that the victory could only be won by entry of the United States into the war. A recurrent theme in Churchill's messages to Roosevelt was the danger to America of a British surrender. Both leaders believed that Hitler's peace terms would demand the surrender of the British fleet. After the fall of France there was serious debate within the American government as to whether further aid to Britain would eventually fall into German hands. Roosevelt decided Britain would continue fighting after the Royal Navy attacked the French naval units at Oran. Harry Hopkins later told Churchill that it was this action against a fallen ally that convinced the President that Britain meant to go on and was worth the risk.

But the daily concerns for Britain's survival were never so great as to distract or discourage Churchill from seeking means of going on the offensive. Churchill never forgot that the war was a contest between a continental power and a maritime empire. He constantly searched for means of employing Britain's naval advantage to allow the British Army means of taking the offensive.

Perhaps the only fact more remarkable than Britain holding on is that Germany lost. In the time span of *Finest Hour* many of the most famous ships in naval history were lost. H.M. Ships *Courageous, Royal Oak, Hood, Ark Royal, Barham, Repulse,* and *Prince of Wales* all sank during this time and most with a terribly high percentage of their crews. This only lists the capital ship and aircraft carrier losses; in the scores of smaller naval vessels and merchantmen sunk during that time many more lives perished.

As the narrative progresses, one of the most fascinating aspects of it is the unfolding of the Enigma code breaking project. The British ability to crack most German and Italian codes was the most important intelligence coup of modern times. It took time for the British to piece together the information and the Germans did not make full use of their codes until their armies stood scattered across Europe. By July 1941 the German naval Enigma code was broken and orders sent to U-boats were read by the British "continuously and with little or no delay." The British began directing convoys away from wolf-packs and shipping losses fell from over ninety vessels in May to less than thirty per month in July and August. In a footnote, Gilbert adds that in February 1942 the U-boats received a new code device that required the British ten months to decipher. Allied shipping losses again rose to dangerous levels and remained high until the new naval Enigma was broken in January 1943. For this reviewer, at least, it seems odd that the German naval staff did not question why the sudden increase in successful attacks occurred at the same time they changed the code of the underseas fleet.

The book is a monument to scholarship. Gilbert has combed through not only Churchill's papers (including unpublished drafts of his war memoirs), but also the diaries and letters of many Churchill contemporaries. It is a detailed study but never tedious, offering readers a well-written study in the critical stage of the Second World War when, in Churchill's words, "the British people held the fort *alone* till those who hitherto had been half blind were half ready."

HAWLEY STEVENS

Atlanta, Georgia

JOHN C. REILLY, JR. *United States Navy Destroyers of World War II* (Poole, Dorset: Blandford Books,

Ltd., 1983. Reprinted 1985 and distributed in the United States by Sterling Publishing Co., New York). 8½" x 11", paper, 160 pages, illustrations, preface, appendices, abbreviations glossary, endnotes, bibliography, index. $9.95.

This volume is a history of the development of the several classes of destroyers which served with the United States Navy during World War II. Editorially, it falls somewhere between the highly technical treatments complete with mathematical formulae that are written for naval architects and the informal works of such authors as Antony Preston and William Schofield which have appeared earlier. It has no accounts of battle or other human dramas associated with destroyers but pays a lot of attention to discussing the origins of each successive destroyer design and the modifications that were made during the war years as combat experience was gained and lessons learned in battle were assimilated. In all, ten classes or subclasses are discussed beginning with the flush-deckers of World War I vintage and ending with the improved *Gearing* or *Allen M. Sumner* type. Plentiful illustrative matter in the form of photographs is featured throughout with sufficient text to give a fairly full accounting of each type of vessel.

Unfortunately, the coverage of destroyer design and evolution is rather uneven. The author does an excellent job of relating the strategic and tactical thinking that went into the drawing up of each class's design specifications. He describes fully the original outfits of weapons and directors that each type contained and how these were altered over the years in the light of new threats, particularly from the air, and decreasing margins of stability. Because destroyers are very long in proportion to their beam, topweight is always a major problem but the need to fit ever increasing numbers of anti-aircraft guns, fire control apparatus, radars, combat information centers and the like was extremely compelling. The solution to this vexing dilemma, incorporated first in the *Fletcher* class and institutionalized in the war-designed *Gearing*s, was to build wider hulls at some sacrifice in speed and to trade offensive torpedo mounts for defensive 40 mm twin and quad anti-aircraft batteries. The odd result was that later classes of destroyers showed no gains in speed over even the very earliest destroyer types and often mounted fewer torpedo tubes than inter-war designs while inexorably creeping upwards in size and tonnage. Not surprisingly the larger a destroyer was the more satisfactory it proved to be.

Although these trends emerge beautifully from the text of this volume, other important considerations are neglected. Little mention is made of the fact that the original design evolution of American destroyer types, which culminated in the four-stackers of World War I, proved to be a technological blind alley and that when destroyer construction resumed in the 1930s it was the British design concepts that we looked to and particularly to the V and W class that was a contemporary of the four-pipers but much more progressive and infinitely more functional. Some mention is made of power plants and boiler arrangements but there is no sustained discussion here. The whole story of how different machinery layouts and provisions for isolating damaged units and cross-connecting surviving boilers and engines to prevent a complete loss of power should have been extensively developed and a schematic diagram provided for each class. Likewise, the evolution of more sophisticated compartmentalization and watertight integrity in hull design is alluded to but never treated in a comprehensive manner. The author would have done well to have sacrificed a few of his seemingly repetitious photographs of quad 40s and torpedo mountings in favor of a cutaway drawing of each major class showing the placement of boilers and engines, magazines, living quarters, radar and sonar rooms, combat information centers and bridge arrangements. A good clear diagram showing how longitudinal framing and compartmentalization schemes differ from the older traverse method would also have been appreciated. A final omission which this reviewer found annoying is the lack of a table detailing wartime destroyer losses together with an account of the cause of each sinking. This would have been much more useful than the organizational table of the Navy Department which did find its way into the appendices.

In conclusion, *United States Navy Destroyers of World War II* is a pretty good value for the money. It will be most pleasing to students of ordnance and weapons system development and least satisfactory to those who follow hull and machinery design. Model makers will relish the many clear photographs of deck scenes and ships' portraits which include rare pictures of the unusual and somewhat obscure *Porter* class "leaders" of 1936-1937. Finally, those of us who enjoy

the "good old days" when surface warships rested in firmly established categories with clearly delineated missions and functions will find something to interest us in this reciting of warship lore which, along with the destroyer itself, is fast becoming antiquarian in nature.

JAMES E. VALLE

Delaware State College

PAUL C. MORRIS, *Schooners and Schooner Barges* (Orleans, Massachusetts: The Lower Cape Publishing Company, 1984). 9" x 12", hard cover, 150 pages, 170 photo illustrations, 18 drawings, appendix, bibliography and index. $25.00.

This is an unusual book on an unusual subject. It is unusual in its number of illustrations relative to its total pages, and its subject has probably never before been dealt with in a published work. For this, despite its broader title, is really the story of the coal-carrying barges which plied the Atlantic coast behind steam towboats early in this century when steam was winning its competition with sail.

The story of the multi-masted schooners, true sailing vessels, which developed during the last quarter of the nineteenth century and ended with the First World War, has been told in other books. But so far as this reviewer is aware no effort has previously been made to assist one in understanding the business which revolved around the barge traffic. The barges, called "schooner barges," simply because they carried some vestiges of sail on one or more masts to assist the towboat, constituted an intermediate step in the transfer of commerce from sailing vessels to steam colliers.

The history of their origins, their development, and their lore is well told, thanks not only to the author's research but also to the recollections and writings of several men who lived the life of bargemen or who handled the tugs which hauled them. Many of the early barges were converted from square-rigged ships which had outlived their usefulness, but still more were designed and built expressly as schooner barges or as unrigged barges by wooden shipbuilding yards which once had built sailing vessels. Steel barges, though less numerous, also played their parts in this unheralded chapter of maritime history.

Contrary to what one might imagine, the life behind a towboat was by no means unrelieved tedium. The hazards were many, accidents frequent, and disasters too often unavoided. As the author says in his introduction, "The story of the schooner barges is one full of unhappy pictures." He then proves the point by countless photographs of stranded or sunken barges. Other fascinating pictures, many published for the first time, show tugs and barges under way, the barges strung out three or four behind the tug, often with sail set.

This book will surely hold the interest of any reader who enjoys maritime history or who has an eye for pictures of vessels. Indeed, the several photographs of true schooners under sail seem to be included primarily to provide some truly handsome scenes as they are almost a *non sequitur* so far as the subject of the text is concerned. Such however is easily forgiven.

An appendix provides an alphabetical listing of schooner barge operators and another of some of the companies with the names and particulars of the barges they owned. A bibliography provides suggested reading for anyone who wishes to pursue the subject, and an index makes it easy to find references to specific topics and vessels.

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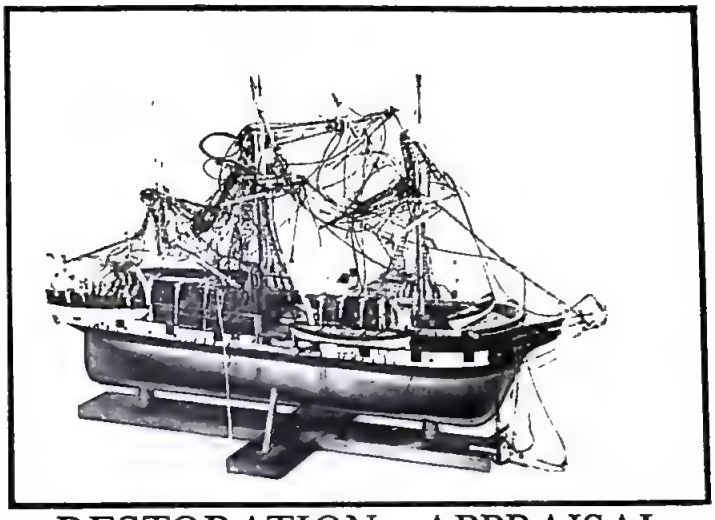

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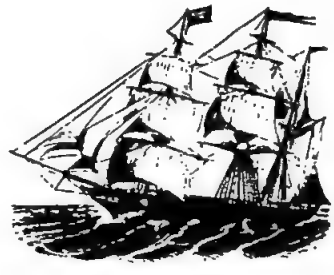

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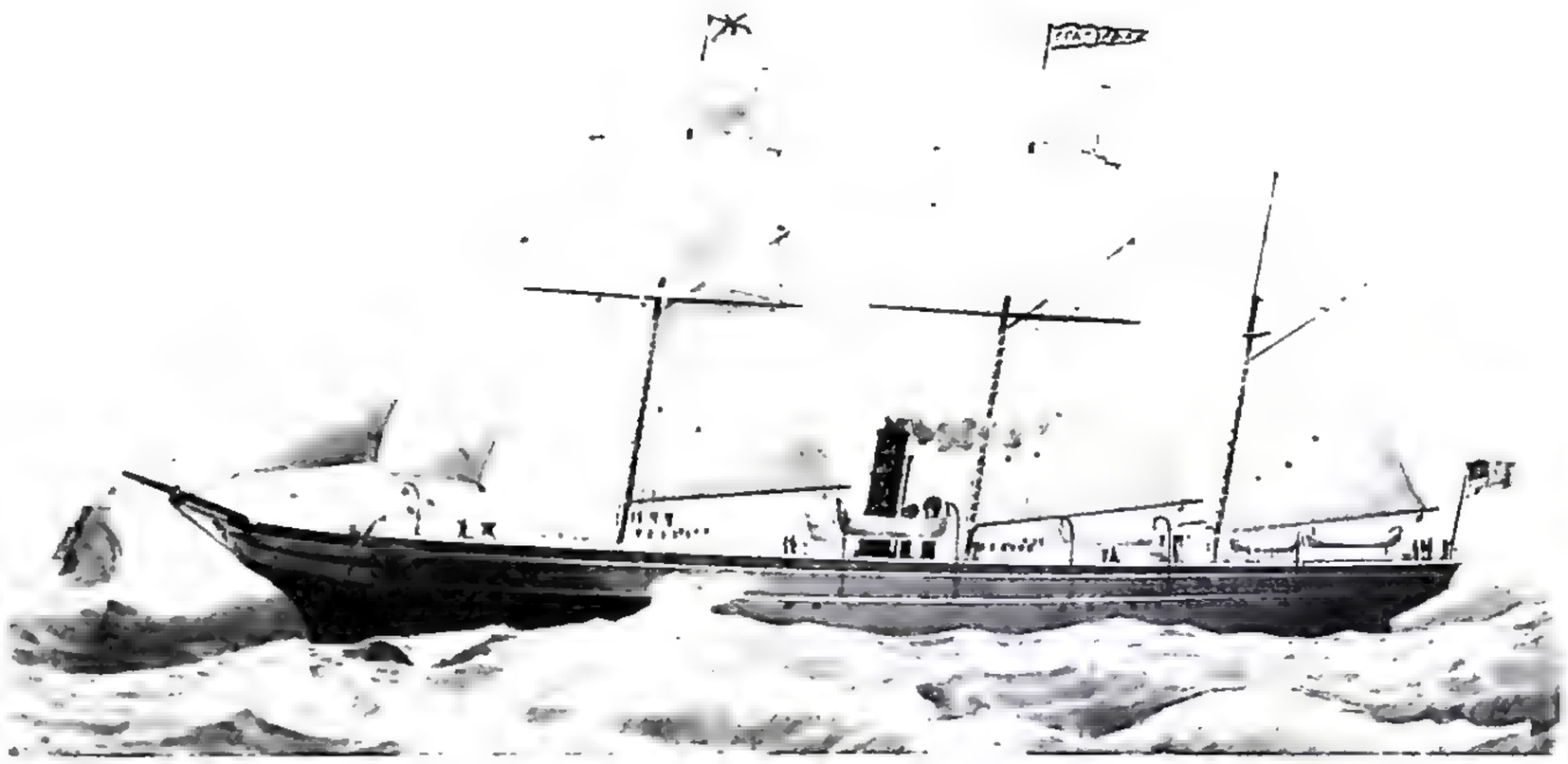

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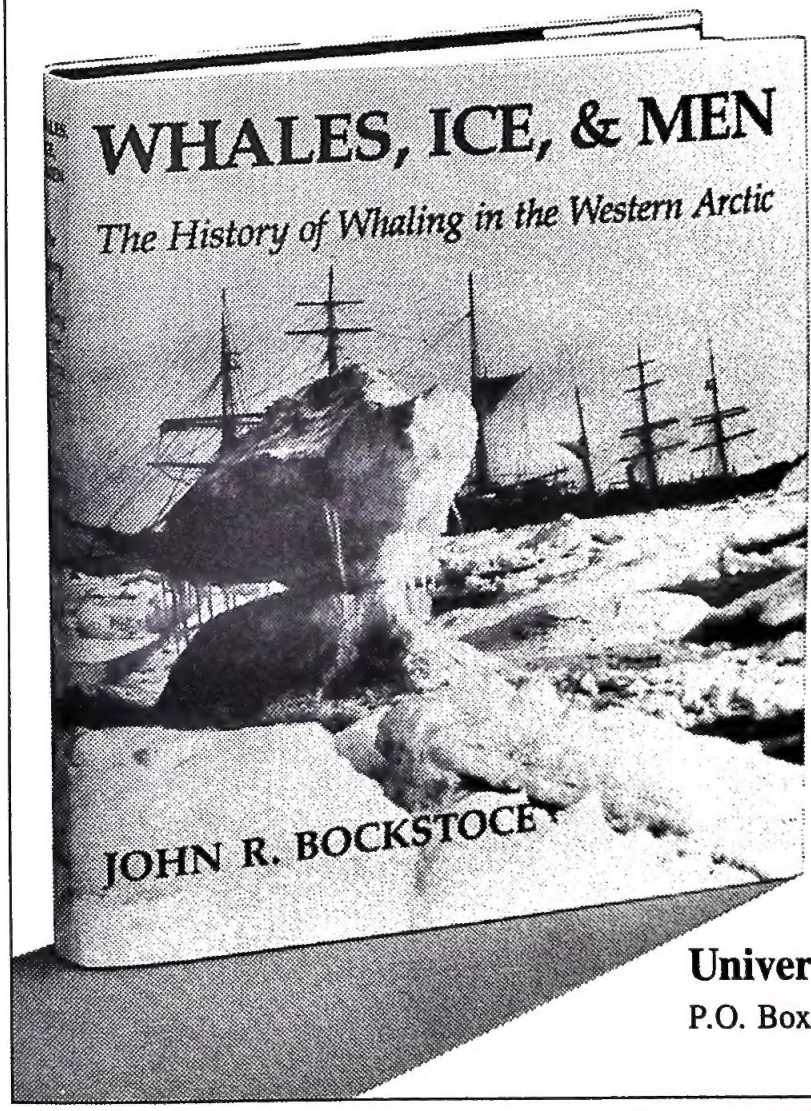

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